Uttar Pradesh Agriculture Growth and Rural Enterprise Ecosystem Strengthening (UP-AGREES) Project

PROJECT IMPLEMENTATION PLAN

Government of Uttar Pradesh

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Abbreviations

AFM	Agriculture Finance Manager
AI	Artificial Intelligence
APC	Agriculture Production Commissioner
CDP	Cluster Development Plan
CHC	Custom Hiring Centre
CIFA	Central Institute of Freshwater Aquaculture
CIFRI	Central Inland Fisheries Research Institute
CIFT	Central Institute of Fisheries Technology
CPIT	Cluster Project Implementation Team
CR	Climate Resilience
CRM	Crop Residue Management
CSA	Climate Smart Agriculture
CSGP	Community Seed Producer Groups
CSIR	Council of Scientific and Industrial Research
CWB	Crop Water Budgets
CWUM	Conjunctive Water Use and Management
DLEP	District Level Extension Platform
DoA	Department of Agriculture
DoF	Department of Fisheries
DPIU	District Project Implementation Unit
DSR	Direct Seeding of Rice
eKCC	e Kisan Credit Card
FAO	Food and Agriculture Organization
FMB	Farm Machinery Bank
FPC	Farmer Producer Company
FPG	Farmer Producer Group
FPO	Farmer Producer Organization
FSSAI	Food Safety and Standards Authority
G2C	Government to Citizen
GAP	Good Agricultural Practice
GDP	Gross Domestic Product
GHG	Green House Gas
GoUP	Government of Uttar Pradesh
GPLF	Gram Panchayat Level Facilitator
GSVA	Gross Value Add
HACCP	Hazard Analysis and Critical Control Points
ICAR	Indian Council of Agricultural Research
ICT	Information and Communications Technology
IIM	Indian Institute of Management
IIT	Indian Institute of Technology
IPM	Integrated Pest Management
IRRI	International Rice Research Institute
IWMP	Integrated Watershed Management Programme
KRK	Krishi Raftar Kendra
KVK	Krishi Vigyan Kendra
LRP	Lead Resource Person
MIS	Management Information System
MRL	Maximum Residue Level

MSME	Micro, Small and Medium Enterprise
MT	Metric Tonne
NGO	Non Governmental Organization
NP	Nyay Panchayat
NPK	Nitrogen, Phosphorous, Potassium
ONDC	Open Network for Digital Commerce
PA	Productive Alliances
PDMC	Per Drop More Crop
PMU	Project Management Unit
POP	Package of Practices
RWCM	Rice Wheat Crop Manager
RWCS	Rice Wheat Cropping Systems
SAU	State Agricultural University
SDG	Sustainable Development Goal
SLTDP	State Level Technology Dissemination Platform
SRPS	Smallholder Rainfed Production Systems
SO	Support Organization
SOC	Soil Organic Carbon
SOP	Standard Operating Procedures
SSM	Sustainable Soil Management
STA	Senior Technical Assistant
TA	Technical Assistant
TAC	Technical Advisory Committee
TOT	Training of Trainers
TSA	Technical Support Organization
UP	Uttar Pradesh
UPAAIF	Uttar Pradesh Agribusiness Alternate Investment Fund
UP-AGREES	UP Agricultural Growth and Rural Enterprise Ecosystem Strengthening
UPBVN	UP Beej Vikash Nigam
UPMIP	Uttar Pradesh Micro Irrigation Project
UPSFA	Uttar Pradesh Smallholder Farmers' Alliance
WUE	Water Use Efficiency

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Background

Situated in the fertile Indo-Gangetic plains, Uttar Pradesh (UP) plays a significant role in India's growth story. UP is the most populous Indian state with nearly 240 million inhabitants and the fourth largest Indian state in terms of land area spread over 75 districts, it has abundant human and natural resources. Growing at 11.39% CAGR (FY15-16 to FY21-22) the state's economy contributes 8 percent to the National GDP[1]. . It Though Uttar Pradesh's is 3.5 times the population of the United Kingdom (UK)and equal to UK's land area but it's economy is still 24.99 Trillion rupees (US $ 300 billion) is approximately[2] 1/10th of U.K.'s economy £2.53 trillion GDP[3]).

The Uttar Pradesh Government has an aim to make its GSDP $1 trillion in the next five years. With 60 percent of the population engaged in agriculture and allied sector activities, agriculture is the primary occupation in the state. This makes UP's growth plans irretrievably intertwined with the growth of the agriculture sector in the State.

The agriculture and allied sectors in UP accounted for 25.5percent of the Gross-Value Add (GSVA) output of the State in 2023-24. While this share has declined by about five percent since F.Y.2011-12, but still higher than the national figure of approximately.18.5 percent... Today, Uttar Pradesh is the largest producer of wheat and the second largest producer of rice in India. Uttar Pradesh agriculture and allied sectors have the potential and capacity to not only feed the entire country but also produce sufficient surplus for exports. However, to reach this potential will require focused efforts. A closer look reveals that the productivity of agricultural crops in Uttar Pradesh has much scope for improvement when compared to that of other states, national and other countries. Further, Bundelkhand and Eastern UP are agriculturally behind and economically poorer than Western and Central regions of the State and need to be uplifted if UP wants to achieve its growth targets.

The next section highlights the challenges within the UP agricultural landscape that need to be addressed, particularly in Eastern UP and Bundelkhand, in order to unleash the potential of UP's agricultural sector.

Challenges in the UP-Agriculture Sector

There are some key challenges in the Uttar Pradesh agriculture sector as highlighted below:

Majority small-holder farmers: The proportion of small and marginal farmers in the state is 95%, significantly higher than the national average of 88% as well as states like

[1] https://niveshmitra.up.nic.in/AdvantageUP.aspx
[2] https://www.ibef.org/states/uttar-pradesh-presentation
[3]https://www.statista.com/topics/3795/gdp-of-the-uk/#topicOverview

Madhya Pradesh (75%)[4] and Maharashtra (80%). A similar trend is seen in landholding patterns, wherein more than 80% of landholdings are less than 1 hectare as compared to the national figure of 68.5%. The large numbers of small holdings pose a big challenge in enhancing productivity and improving resource use efficiency. The low income and increasing land fragmentation have resulted in agriculture being trapped in a low investment cycle. The area cultivated by small and marginal farmers has increased significantly, hampering investments in mechanization and the adoption of modern inputs and production technologies. This impedes agricultural growth, particularly with the depleting quality of soil and water resources.

Low Productivity: Though Uttar Pradesh is the largest producer of wheat and the second largest producer of rice in India, the average productivity of major crops is either at par or lower than the national average and far below high productivity states in the country as indicated in the table below. Further, despite contributing towards 31% of India's wheat, 13% of rice, and 10% of pulses, the annual income of farming households in the state (INR96,732) remains far below the national average (INR 122,616) and of states like Maharashtra (INR137,904) and Gujarat (INR151,572)[5].

Table 1: Crop Productivity Comparison (q/ha) 2020-21

Crops	India	Uttar Pradesh	Highest Yield	State
Rice	27.13	27.59	43.66	Punjab
Wheat	34.64	36.04	48.62	Punjab
Jowar	11.28	15.78	30.7	Andhra Pradesh
Bajra	14.36	22.21	23.72	Haryana
Maize	31.95	23.31	68.2	Tamil Nadu
Nutri-Cereals	21.46	22.66	65.63	West Bengal
Urad	4.52	4.98	5.68	Maharashtra
Moong	4.07	3.58	5.55	Maharashtra
Sesame	4.13	2.26	9.74	West Bengal
Gram	12.17	13.76	15.68	Gujarat
Arhar	8.92	9.88	11.38	Jharkhand
Lentil	10.01	9.88	11.39	Madhya Pradesh
Pulses	8.92	10.79	12.75	Gujarat
Rapeseed/Mustard	15.11	14.12	20.27	Haryana
Oilseeds	12.54	10.54	20.73	Tamil Nadu

Source: Agriculture at a Glance 2020-21 and Department of Agriculture Reports

[4] http://www.slbcmadhyapradesh.in/agriculture.aspx
[5] https://pib.gov.in/PressReleasePage.aspx?PRID=1884228

Inter and Intra Regional Productivity Disparities: The State is diverse in natural resources namely: climate, soil, topography, cropping pattern and socio-economic conditions and its 75 districts are divided into 4 distinct socio-economic regions namely: Western (26 Districts), Central (14 Districts), Eastern (28 Districts) and Bundelkhand (07 Districts), 9 agro-climatic zones and 20 agro-ecological zones.

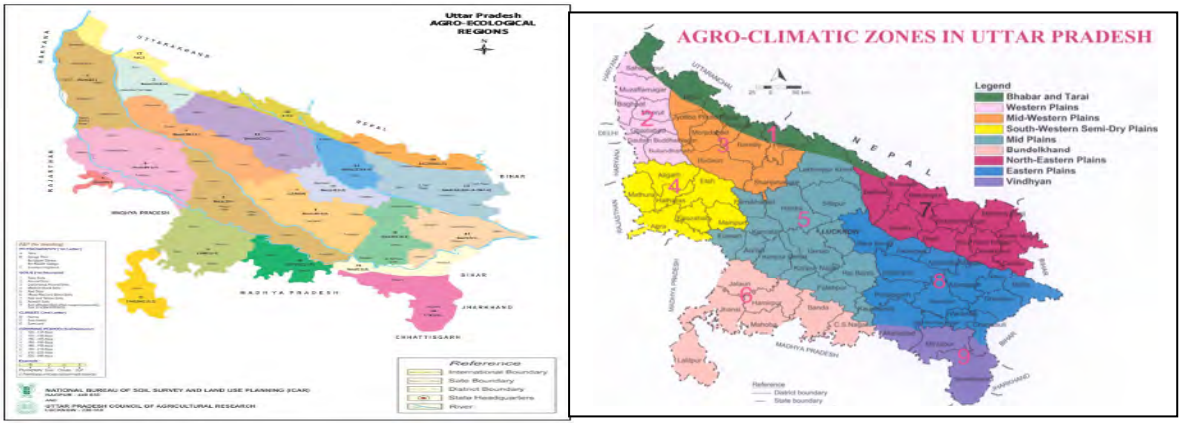


Figure 1: Agro Ecological and Climatic Zones in UP

The agriculture house-hold income as well as agricultural statistics in UP's Western and Central regions are much higher than the Eastern and Bundelkhand regions due to low-input use efficiency (soil, water, seeds, other external inputs) and lack of other infrastructural and ecosystem facilities in the latter. The variation in crop productivity between districts in Western UP and Eastern UP/Bundelkhand is illustrated in Table 2.

Table 2: Productivity of Major Crops in UP (q/ha)

Divisions	Jhansi	Chitra koot	Varana si	Mirzap ur	Azamg arh	Gorak hpur	Basti	Devip atan	UP	West region
Rice	18.28	24.18	30.64	31.52	24.53	24.74	27.02	22.04	26.86	27.71
Maize	12.52	20.00	18.87	12.06	12.76	13.15	20.88	10.92	20.88	28.63
Bajra	12.41	10.63	13.46	12.60	21.70	21.70	21.76	22.50	21.70	23.88
Urad	4.41	1.97	9.74	5.75	5.70	5.88	5.71	5.70	5.70	10.51
Moong	3.07	2.24	3.24	3.25	3.33	-	-	-	3.24	3.25
Wheat	35.62	33.43	36.20	30.96	35.25	37.17	38.19	32.09	37.35	41.49
Gram	14.07	13.38	17.03	13.96	14.11	13.49	13.49	13.49	13.49	12.81
Pea	16.34	15.13	15.06	14.05	14.75	15.49	11.18	15.49	15.49	12.05
Mustard	10.60	9.69	14.97	12.63	14.97	11.24	14.97	10.19	14.97	18.24

Source: Agriculture Statistics Division, Dept. of Agriculture, UP No. 80/2023/1436/12-2-2023

Moreover, crop cutting experiments organized by the revenue department under guidance/ assistance from the Statistics Division of the Department of Agriculture of UP have indicated an **intra-regional productivity disparity** whereby there are large gaps in productivity of major crops even within the districts and blocks of Eastern and Bundelkhand, as shown in the Table 3. In fact in some cases, the crop productivity is equivalent to or higher than the average productivity recorded in the best performing district in the state.

Table 3: Productivity variations in major crops (q/ha)

District	Block	Crop	Highest Yield (q/ha)	Lowest Yield (q/ha)	Yield difference (q/ha)	Yield variations (%)
Deoria	Bhaluani	Paddy	27.97	20.39	7.58	37.18
	Pathardewa	Paddy	25.44	20.09	5.35	26.63
	Bhaluani	Wheat	36.1	26	10.1	38.85
	Pathardewa	Wheat	41.41	29	12.41	42.79
Varanasi	Chiraigao	Paddy	31.49	24.2	7.29	30.12
	Chiraigao	Wheat	42.47	29.22	13.25	45.35
Jhansi	Babina	Urad	7.4	1.85	5.55	300.00
	Babina	Ground nut	18	10.02	7.98	79.64
Lalitpur	Talbehat	Urd	3.88	1.71	2.17	126.90
Mau	Kopaganj	Paddy	29.97	15.89	14.08	88.61
Gajipur	Mardah	Paddy	29.1	23.51	5.59	23.78
	Mardah	Wheat	41.53	37.24	4.29	11.52
Jhansi	Babina	Wheat	33.25	25.99	7.26	27.93
	Babina	Gram	14.44	11.24	3.2	28.47
	Bamour	Pea	15.24	12.57	2.67	21.24

Source: Agriculture Statistics Division, Dept. of Agriculture, Year 2022-23

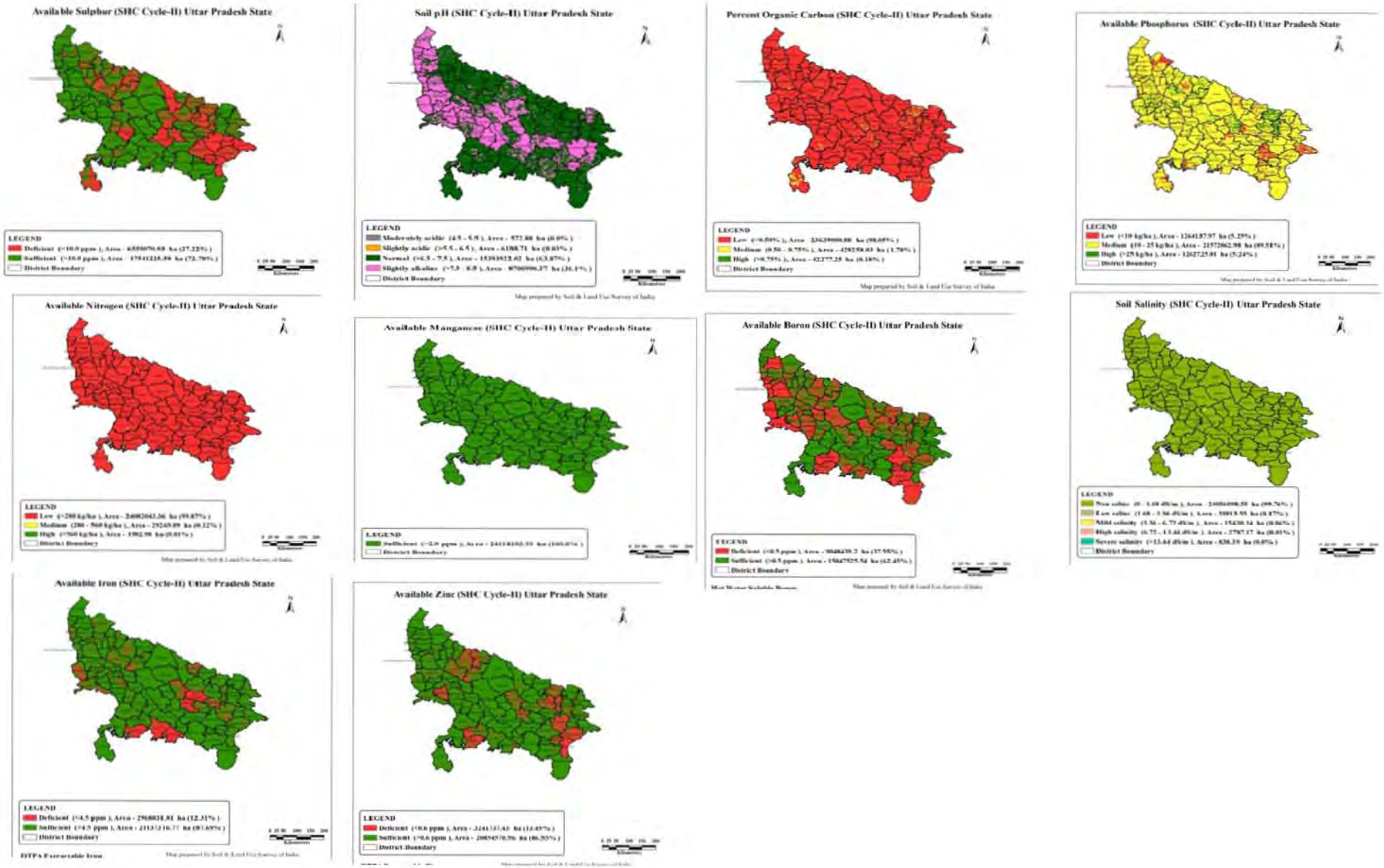
These inter and intra-regional yield variations indicate that by adopting suitable agronomic practices with high quality seed and timely varietal replacement along with balanced use of fertilizers and crop protection measures, there is an opportunity for farmers to enhance the productivity of these crops and unleash the agricultural potential of Eastern UP and Bundelkhand region.

Deteriorating Soil Health: Deteriorating soil health is one of the major causes of reduced productivity of various crops in Uttar Pradesh cause by low soil organic carbon (SOC) and imbalanced use of fertilizers.

- **Low Soil Organic Carbon (SOC):** For enhancing crop yields, the availability of Soil Organic Carbon (SOC) is the key factor. According to the soil analysis reports available for the state, out of 827 blocks 399 fall in the very low (<0.25 percent) category and 421 blocks are in the low (0.25-0.50 percent) category in SOC.

- **Imbalance Use of Fertilizers:** The status of NPK in the soil is in the low/very low category in all 75 districts of UP. The use of excessive nitrogenous fertilizers instead of a balanced use of NPK fertilizers has resulted in an NPK consumption ratio of 18.7:6.2:1 in 2021-22 compared to 11.14:3.88:1 in 2010 in UP. The all-India NPK ratio is 7.1:2.8:1. Further, soils in UP are deficient in most micro-nutrients such as Zinc, Boron, Iron, and secondary nutrients like Sulphur and Calcium. Enhancing the application of micro-nutrients and secondary nutrients, based on soil test reports is a big challenge as well as an opportunity for the small and marginal farmers of the State.

Figure 2: Soil nutrient deficiency status



Irrigation: The net irrigated area in the state is 142.31 lakh hectares which is 85% of a net sown area of 165.73 lakh hectares[6]; 15.2 percent through canals, 74.9 percent through tube wells (of which 72.51% is by shallow tube-wells), 8 percent through wells, and remaining through other sources. The state has 382 reservoirs covering 2.28 lakh hectare water area, and 161075 ponds covering 1.73 lakh hectare water area.

One of the key challenges facing the irrigation sector in Uttar Pradesh is bridging the gap between irrigation potential created and utilized, and uneven distribution of water over the length of the canal system. Since most of the canals in the existing system are old, they are unable to meet the irrigation intensity requirements of the tail end farmers. In general, private tube wells are the major source of irrigation, leading to a depletion of groundwater levels. In this context, to sustain adequate water supplies, groundwater management in the state is becoming a formidable challenge as well the foremost priority. This reduction in availability of water is compounded by climate change.

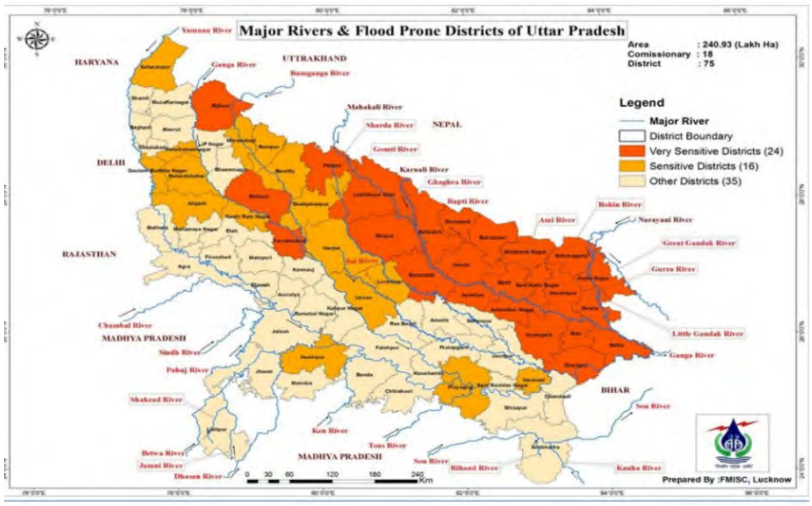


Figure 3: Flood Prone Districts of UP (FMISC), UP Flood Book 2019

Climate Change: The adverse impact of climate change is seen at all levels from availability of water and other natural resources to food grain production and food security, to small and marginal farmers and existing ecosystems and finally rural communities and economies. Uttar Pradesh is highly vulnerable to the impacts of climatic change and climate induced disasters.

[6] https://farmech.dac.gov.in/FarmerGuide/UP/UI.htm

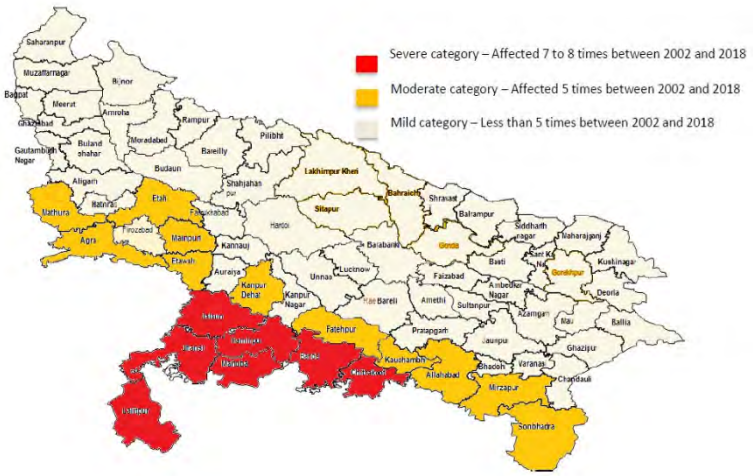


Figure 4: Districts Experiencing Drought 5-8 times between 2002-2018 (UPSDMA), Drought Management Guidelines 2022.

Between 1969 and 2019, the state faced 2539 floods, 17144 cold waves days and 6726 disastrous heat wave days. Out of the 75 districts in the state, about 50 districts are high to moderately vulnerable, many of which are in Eastern UP and Bundelkhand regions and the number of these districts is likely to increase in the future.

Climate change has brought a perceptible change in amount and pattern of rainfall in the State. Rainfall data clearly shows that total yearly average rainfall has come down by around 500 mm in the state**.**

Table 4: Monthly Rainfall in UP (mm)

Month	Normal	Average Rainfall 1971-81	Average Rainfall 1981-91	Average Rainfall 1991-01	Average Rainfall 2001-02	Average Rainfall 2011-12	Yr. 2021-22	Yr. 2022-23
June	95	140.6	92.7	100.0	90.7	90.2	146.0	43.2
July	280.9	425.5	291.7	238.3	225.8	246.2	204.2	143.0
Aug	275.6	376.2	240.4	298.2	194.7	198.7	205.9	132.0
Sept	178.3	222.4	185.7	172.1	148.6	115.2	169.9	196.6
Oct	35.8	30.2	35.9	29.7	22.8	18.0	86.8	139.9
Nov	4.9	3.4	4.0	5.5	2.3	1.3	0.1	0.2
Dec	6.8	9.2	11.9	8.8	2.5	4.5	4.6	0.1
Jan	17.6	17.5	13.7	15.3	7.1	18.1	39.8	7.1
Feb	19.9	13.2	16.1	16.5	14.7	14.5	14.7	0.0
Mar	10.2	11.9	10.4	8.9	6.4	14.6	0.0	24.2
Apr	7.3	6.1	10.3	8.6	4.7	7.2	0.0	11.1
May	15.1	27.4	20.6	17.7	17.9	21.7	23.3	21.3
Total	947.4	1283.3	933.56	919.7	738.331	750.148	895.3	718.7

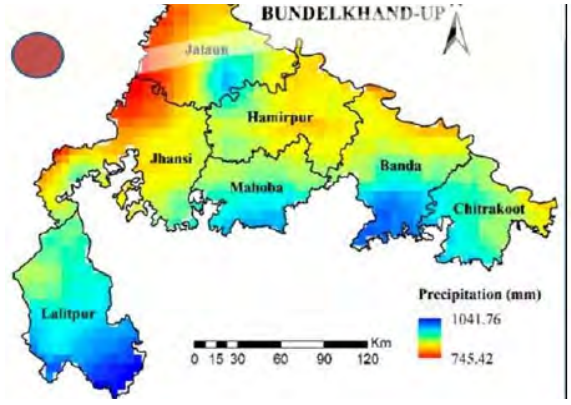


Figure 5: Precipitation Variability in Bundelkhand

Frequent drought years have been observed across the State and particularly in the Bundelkhand region which is one of the major reasons for poor agricultural growth of the region.

Need to move from Agro-climatic to agro-ecological approaches: Traditionally, the established agro-climatic zone approach has been used in Uttar Pradesh to design

agriculture projects. However, this taxonomy has increasingly become irrelevant keeping in mind the significant climatic, soil, cropping patterns and productivity variations observed within the same agro climatic zones. The agro-ecological zones approach considers these variations, making it more suitable for micro-level planning for longer term sustainability, climate resilience and also enhancing existing productivity levels.

High-quality seeds: Timely access to good quality seeds is a big challenge for small holder farmers in UP and is one of the major causes for low productivity in agriculture in the state. Good quality seed increases the productivity up to 15-20 %. Currently the average seed replacement rate (SRR) in the state is 45%, about 47% for wheat, 54% for rice but much lower for oilseeds (sesame is 33%) and pulses (urad is 27%).

In addition to insufficient availability of high quality seed and timely distribution, farmers continue to use old seed varieties due to a general lack of awareness about new varieties of seeds. So, there is also a need to increase the varietal replacement rate (VRR) and replace these old seed varieties with climate resilient, high yielding varieties.

Access to Mechanization: Mechanization is a critical input in farming that is often beyond the reach of the millions of small-holder farmers. Field interactions and discussions with the custom hiring centers (CHCs) and farm machinery banks (FMBs) have revealed that the custom hiring centers (CHC) policy of the State is not effective on the ground. In addition to monopolization of CHCs by large farmers, there continues to be a mismatch in the non-tractor market between the mechanization requirement of small/marginal farmers and supply in the market. Moreover, there is limited awareness of the benefits of farm implements/equipment amongst farmers, a lack of institutional structures and processes to make the relevant farm machinery available to farmers at a village and block level and lack of available finance to make upfront payments for rental.

Post Harvest Management:

- **Storage Facilities:** Despite UP being the highest producer of food grains in India (approx. 65m000 MT per year), the food grain storage capacity in the state is sufficient to cater to only 10% (6,658 MT) of the produce[7]. Madhya Pradesh in comparison produces 32,844 MT and has storage capacity for 48% (15,780 MT) of the produce.

  UP farmers also use unscientific methods of storage, which leads to considerable wastage of agriculture produce i.e., about 15 percent is wasted in the case of non-perishable commodities and it increases to approximately 30 percent in perishable commodities category, leading to poor price realization of the produce.

[7] https://pib.gov.in/pressreleaseshare.aspx?prid=1578907; https://www.statista.com/statistics/620922/food-grain-production-by-state-india/

- **Primary and Secondary Processing Facilities:** Only 6% of Uttar Pradesh's produce gets processed. Further, agricultural produce is not graded and sorted and instead the practice of *dara* is prevalent whereby a heap of the entire quantity and quality of a crop is sold as a common lot. Thus, the farmers producing better quality produce do not get a better price and also have no incentive to use improved varieties.

Knowledge and Extension Resources: Uttar Pradesh has wide range of local, national and international institutions focused on agriculture, some of which are well renowned but not being sufficiently leveraged for the benefit of small holder farmers in UP and for increasing agricultural productivity in the state.

For example, the state has 4 State Agricultural Universities (SAUs), 3 Central Agriculture Universities, 1 Veterinary University, 1 Private Agriculture University, 1 Deemed-to-be-University and 43 colleges that impart higher education and conduct research activities in agriculture and allied sectors. In addition, there are 15 ICAR Research Institutions, 4 CSIR Laboratories and the IRRI South Asia Regional Centre as well as an Indian Institute of Management (IIM), Lucknow and Indian Institute of Technology (IIT), Kanpur based in Uttar Pradesh. Further extension services are provided by line departments, 89 Krishi Vigyan Kendra (KVKs), SAUs, Fertiliser & Marketing Companies.

There is a need for more concerted efforts to develop productive partnerships with these institutes for the benefit of Uttar Pradesh agriculture.

Allied Sector – Fisheries

Fisheries and aquaculture are equally significant for support in Uttar Pradesh in view of the State's underlying resources, potential for further development, wide gap between existing production and demand, and providing livelihood for a large number of resources scarce rural communities. In UP, where protein malnutrition is a serious problem with 42.3 percent of its children under five are underweight, fish can provide the cheapest source of quality animal protein. Fisheries and aquaculture also facilitate and encourage harvesting of rain and flood waters, holding them in undrainable ponds, floodplains, reservoirs, lakes etc., and allowing these ecosystems to produce goods such as fish, aquatic fruits, plants, etc., and performing a range of ecosystem services like supporting aquatic and terrestrial biodiversity, recharging ground water table and making water available for domestic use, irrigation, livestock animals, etc.

The fisheries resources of the state available in the form of rivers, reservoirs, floodplains and lakes are largely public or Common Property Resources (CPR) which provide livelihood to a large number of resources scarce landless rural communities. This is highly relevant in the context of the state where incidence of poverty is high, especially in rural areas. On the other hand, aquaculture, which is akin to agriculture and livestock farming, offers opportunities for farmers and entrepreneurs to take it up as a separate farming activity or as a means to diversify their ongoing farming practices. It has also been observed that agricultural farming households do equally well in livestock and aquaculture due to their acquired farm management skills and integrating resource use and recycling of wastes in their family farming system.

Fortunately, although UP is a landlocked state it is blessed with enormous inland fisheries and freshwater aquaculture resources in the form of rivers (25,000 km), canals (45,000 km), reservoirs (1.57lac ha), lakes (1.84lac ha), riverine wetlands (0.61 lac ha) and ponds (1.61lac ha). The state is also known for its rich fish biodiversity and its riverine system is the home ground for most of the economically important freshwater fish species including the Indian Major Carps (IMC) which is the backbone of freshwater aquaculture of the country, South Asia and a number of Southeast Asian countries.

All these clearly indicates that the potential of fisheries and aquaculture complementing other farming practices like livestock, dairy, horticulture and agriculture is enormous and deserves priority attention for development.

Government Schemes related to Fisheries

With the advent of Central and State Government interventions and innovations like Blue Revolution Scheme (launched in 2016) which was taken over by Pradhan Mantri Matsya Sampada Yojana (PMMSY) in 2020, fish production has been increasing manifold and substantially contributes towards creating rural employment through extensive, semi-intensive and intensive fish culture and various dimensions of entrepreneurship in the

fisheries sector. This has led to a change in the general perception that earlier considered fish farming as a low-profile business with many risk factors involved. As a result, many youngsters have been coming forward spontaneously to adopt pond culture, fish seed rearing and fish feed production and management practices as their full-time occupation.

Before 1975, the pond fish culture was unorganized and in a very primitive stage with least productivity. Most of the fish produce arriving in the fish market was from riverine resources and open waters and contributed to nearly 70% of fish produce. Farmers and fishers generally used to practice pond culture in the traditional way as a hobby with a very low average fish productivity of 300kg/ ha/yr.

However, with the introduction of the centrally Sponsored Scheme of Fish Farmers Development Agency (FFDA) launched in 1975-76 by Government of India (GoI) extensive fish culture in ponds and lakes gradually got popularized and well adopted by fish farmers. With better handholding and adoption of a scientific approach in the form of extensive fish culture, aquaculture chiselled the shape of the sector by using available water resources and created great avenues for rural employment. Fish productivity of fish farmers further increased when many fisheries infrastructures including fish hatcheries, nurseries, marketing and fish farmers training facilities etc were established by central/ state governments for better handholding and capacity building encouraging fish farmers to come forward to perform pond fish culture in a scientific way. The scheme drastically changed the scenario of pond farming which led to enhance average annual fish yield from 300kg/ ha/yr to 3000kg /ha/yr in community ponds as it was registered in 2011-12 in the case of Uttar Pradesh. Further, semi- intensive and intensive fish culture methods with promotion of entrepreneurship have been invoked after year 2016 through the intervention of Blue Revolution scheme followed by Pradhan Mantri Matsya Sampada Yojana (PMMSY) ensuring horizontal and vertical expansion of fisheries and aquaculture.

Pradhan Mantri Matsya Sampada Yojana (PMMSY)

Pradhan Mantri Matsya Sampada Yojana (PMMSY), a national wide initiative by GoI dedicated for the inclusive development of aquaculture and fisheries, was started for five years (2020-2025) with a total investment of Rs 20,050 crores having 02 major subcomponents i.e. centrally sponsored scheme (CSS) of Rs 18330 crores including central share, State share and Private/ Beneficiary share and Central Sector scheme (CS) of Rs 1720 Crores. Under central sector component 100 percent funding is allowed and under this direct beneficiary oriented (individual/group) activities are undertaken by the entities of Central Government. Individuals can submit their project proposals directly to the Central entities like NFDB (National Fisheries Development Board, Hyderabad) to get admissible project subsidy which is 40% for general category and 60% for woman beneficiary/ SC/ST.

Under the Centrally Sponsored scheme 60% share is borne by GoI while the remaining 40% is contributed by the concerning State Government[8].

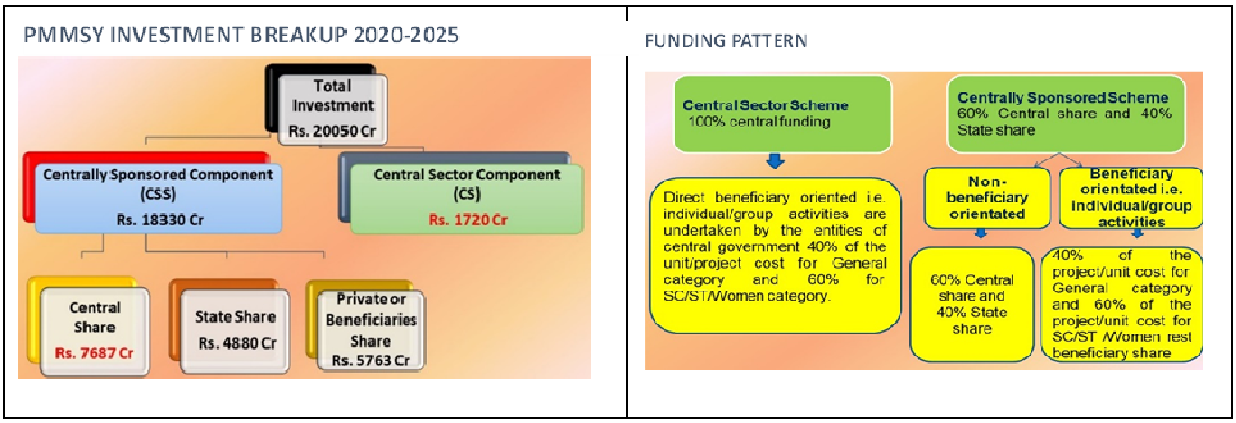


Figure 6: PMMSY Scheme Details

It is pertinent to mention here that PMMSY is being conducted on the basis of project-based scheme and does not support aquaculture production from community and private ponds which are the main stay of landless/ marginalized fishers and fish farmers.

State owned schemes for fisheries promotion

There are three main schemes implemented by the UP State Government

1.Mukhya Mantri Matsya Sampada Yojana: This scheme was launched in year 2023 with an aim to promote aquaculture and fisheries in leased out community ponds through provision of project subsidy to the lease holders of the community ponds. For the first-year input support is provided] 40% of project subsidy (Rs 1.60 lakh for a project cost of Rs.4.00 lakh/ha with the beneficiary contributing 60% of the input cost). This scheme is in operation for period of five years and targets tocover approximately 3000 ha of community ponds across the State.

2. Nishad Raj Boat Subsidy Yojana: This scheme was launched in the year 2022-23 and was designed to protect those who are dependent for their livelihood on fishing/ fish catch from reservoirs/ponds/lakes/ rivers and other fisheries resources. The scheme is for a period of 05 years from 2022-23 to 2026-27 with a provision of Rs 44.425 crores for the entire scheme period. The scheme facilitates procurement of non-motorized boats/nets/ life jackets and ice boxes.

3.Uttar Pradesh Matsya Kalyan Kosh: This social welfare scheme has been initiated recently in the year 2023-24 and aims to address the socio- economic upliftment of fishers by providing facilities for better living standards as well as women empowerment of fishers and fish farmers. With a budget provision of Rs 25 crores/year, the scheme provides

[8] This scheme further has two categories of funding patterns, Viz, beneficiary oriented and nonbeneficiary oriented activities. Under non beneficiary oriented component 60% and 40% sharing is contributed by GoI and the State respectively while under beneficiary-oriented activities 40% of the project cost is provided as grant in the general category and 60% in the case of ST/ST/ Women categories.

financial support for creating infrastructure facilities like Machhua Awas for homeless fishers, installation of solar lights, medical reimbursement, student scholarships, establishment of community centres, social awareness.

A sub-component of the scheme supports women empowerment in the form of "Mata Suketa Mahila Matsya Palak Sashaktikaran Pariyojana" which provides subsidy to those women fishers who are traditionally involved in fish culture and farming and want to install fish cages in reservoirs but did not receive any financial assistance earlier. The sub- scheme provisions to provide project subsidy of 60% on project cost of Rs 3.00 lakh for installation including input cost of fish cage/ unit/ woman beneficiary for fish culture cum capture.

Status of Fish Production: Uttar Pradesh

The total national fish production registered in year 2020-21 was 162.48 lakh tons out of which the inland fish production was 121.21 lakh tones. The fisheries sector has contributed Rs 2,32,620 crore or 1.1% to the Indian economy (GVA) in 2020-21. Fisheries contributed 6.72% to the agriculture economy in India and 8% to the global fish production of 178 million tonnes. Uttar Pradesh ranks 3rd amongst major inland fish producing states in India. The estimated fish production in Uttar Pradesh was 7.46 tonns in 2020-21, 8.09 tons in 2021-22, 9.13 lakh tonnes in 2022-23[9] and is estimated to keep increasing. Andhra Pradesh is the highest fish producing state with 42.19 lakh tones followed by West Bengal with 16.52 lakh tones and Uttar Pradesh with 8.09 Lakh tonnes in 2021-22[10].

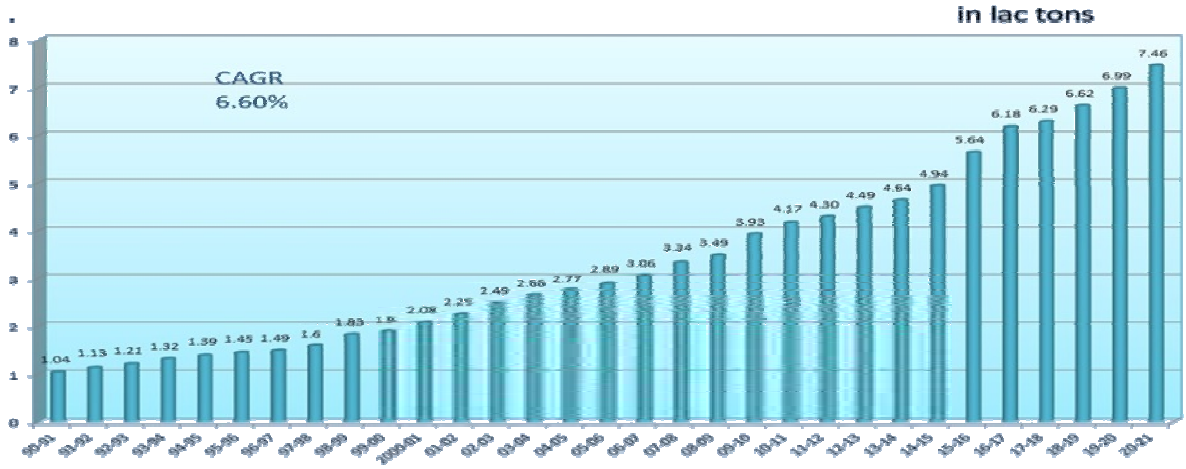
Table 5: Fisheries and aquaculture resources utilization status in UP (2020-21)

Resources	Area (lac ha)	Utilization (lac ha)	Production (lac ton)
Aquaculture			
Community pond (>0.2ha)	122405	68839.20	3.090
Private ponds	0.12042	10000	0.5405
DOF, Irrigation, local body	0.05366	0.05366	0.84668
Pangasius & others	- -	--	0.41065
Shrimp	0.00036	0.00036	0.00124
Recirculatory aqua culture	--	--	0.0348274
		Aquaculture total	**4.9238974**
Fisheries			
Reservoir **	1.57	1.49	0.2053154
Lakes	1.33	1.33	0.44336.57
Water logged areas	1.64	1.64	2.2602411
River	25,000 km	25000 km	0.0519568
Canal	>45,000 km	45000 km	0.0185883
		Fisheries total	**2.536102**
		Grand total	**7.459999**

Source: Department of Fisheries, UP

[9] Source: Department of Fisheries, UP
[10] Source: Hand book on fisheries Statistics 2022, Ministry of Fisheries, AH and Dairying, GoI

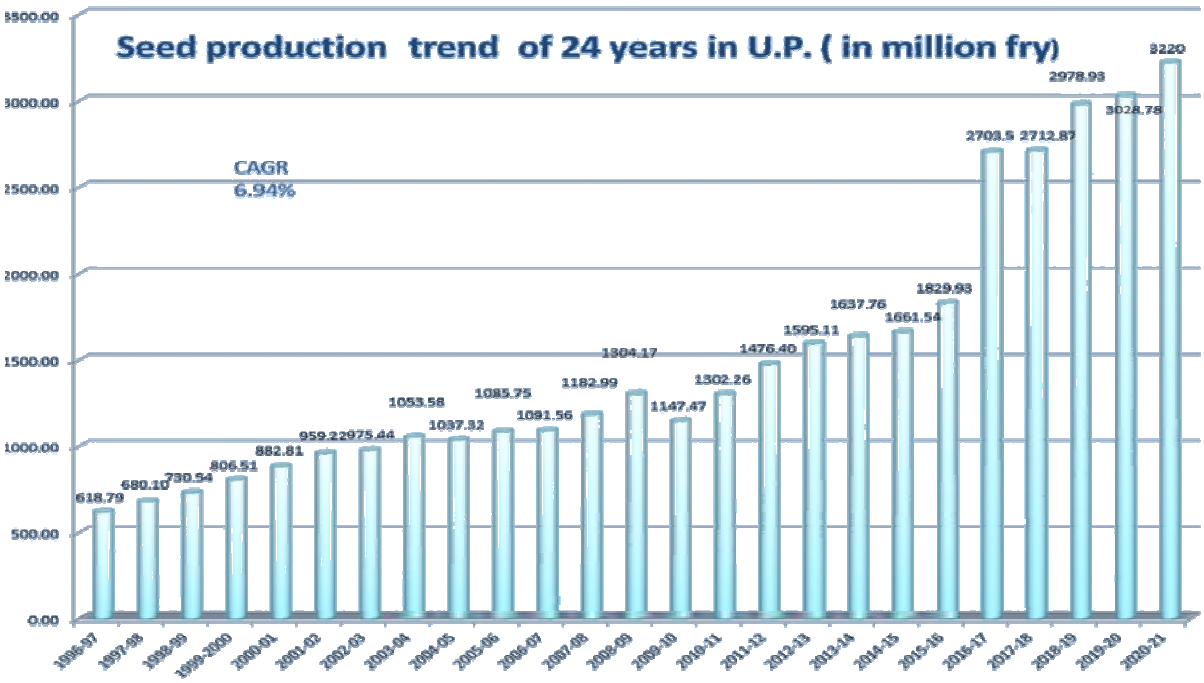
Figure 7: Uttar Pradesh Fish Production Trends (1990 to 2021)



Source: Hand book of fisheries Statistics 2022 published by Ministry of Fisheries, AH and Dairying, GoI and Dept of Fisheries, UP

With growing acceptance of aquaculture and advancement in fish production in recent years the demand of fish seed of economically important fishes is on the rising trend which is shown in the chart given below:

Figure 8: Fish Seed Production Trend UP



Source: Department of Fisheries, UP

Increasing fish consumption trend in UP: Fish is protein rich and a good source of animal protein available at reasonable prices. Fish demand and consumption has been increasing many folds due growing awareness of its health benefits and an increasing acceptance for its consumption among the non-vegetarian population of the state. Approximately 60% population of UP is omnivores and about 56% people like fish. According to state-wise fish consumption data published by GoI in 2022-23, as per data

collected for year 2020-21, per capita fish consumption of Uttar Pradesh is estimated to be 11.09 kg. Amongst inland states fish consumption in Tripura (25.53kg), Manipur(18.25kg) Chhattisgarh (19.7kg) Assam(11.89kg), Uttar Pradesh (11.09kg) is comparatively high, while the highest producing fish State Andhra Pradesh is lagging behind in this respect and reported a 8.9 kg per capita fish consumption. The required current fish demand of UP is 14.59 lakh tones whereas the local fish production from all resources is estimated to be 9.13 lakh tones in 2022-23 which contributes to only 62.58 percent of the State fish demand wherein 5.46 lakh tones (37.42%) is being imported from other states putting UP on the list of net fish importing states. **Major constraints in the Uttar Pradesh Fisheries sector**

1. Over exploitation and depleting resources affecting natural fish fauna:

A huge fishermen and riparian population estimated to be one crore resides in UP which contributes to approximately 4% of the total human population of UP. Approximately 39 lakh fishers directly or indirectly depend on aquaculture and fisheries activities which are the main sources of their livelihood. River Ganga and its tributaries form a vast network of running waters with considerable number of fish species of Indian Major carps and minor carps. Fishers usually do not understand and are unaware of the fragile nature of the ecosystem due to lack of knowledge and indulge in over exploitation of resources for their immediate benefits leading to irrational and premature fishing and catching of brood fishes during fish breeding season thereby destroying many fish offspring. Other reasons responsible for decreasing fish population in natural waters and hampering the ambient environment for natural growth of fish wealth are climate change causing unpredicted, untimely and uneven erratic rainfalls, blockade in riverine flow due to constricted river beds, siltation destructing perennial course of water flow, destruction of fish breeding grounds (many fish species are on the verge of extinction), contamination with heavy metals and pesticides and polluted surface water because of direct drainage of industrial effluents in rivers and other anthropologic reasons.

2. Low fish production:

In UP fish demand has been increasing year over year due to a rise in the fish-eating population. The current fish demand of UP is 14.59 lakh tones wherein the indigenous fish production from all resources is estimated to 9.13 lakh tones in year 2022-23. Thus, the indigenous fish production contributes only 62.58 Percent of state fish supply demand wherein 5.46 lakh tones (37.42%) is being imported from other states making UP a net importer of fish.

Despite having enormous potential for development and growth, the fisheries sector in UP has a long way to go. The per ha fish productivity in aquaculture and reservoir fisheries are quite low compared to its potential. Aquaculture sector contributes a major portion of fish production at 4.923 lakh tones/ year (as on year 2020-21), which mainly comes from

leased out community ponds (71633.68 ha), private ponds and semi-intensive/ intensive fish culture ventures. The balance contribution comes from reservoirs, lakes, water logged areas, river and canal resources. The average fish productivity from all sources of aquaculture in UP is 4.5 ton/ha/yr whereas it can be optimally increased to 7 tons/ha/yr especially in the case of composite carp culture which is a very common fish culture practice. Semi intensive and intensive fish culture are also undertaken by progressive/lead fish farmers in the form of Recirculatory Aquaculture System (RAS) and bioflac which are totally based on ensured supply of quality seed (Pangasius, Gift Tilapia, Singhi, Indian Magur, Shrimp etc) and extruded palletized fish feed. Further, even though, community ponds put on lease are the main source of subsistence for fishers and are also the substratum for aqua culture, they have an average productivity below 4 tones/ha/y which can be increased to 7 tones/ ha/y.

The low fish production in UP can be attributed to the following two reasons:

A. Paucity of quality fish seed:

Poor quality of seed is a major constraint for the expansion of aquaculture in UP. The availability of quality fish seed at the right time and at the right location is a prerequisite for sustainable aquaculture development. Although carps, both indigenous and exotic make up the bulk of fish in the state, several other species like Indian magur, minor carps, freshwater prawn and exotic catfish (pangasius) are also important. Many fish hatcheries mainly established in the private sector are involved in fish seed production and distribution. Deterioration of the quality of fish seed due to genetic inbreeding is a matter of concern. In practical terms, quality seed may be defined as that which has better food conversion efficiency (FCR), high growth rate potential, better ability to adapt to changing environmental conditions and resistant to diseases.

Appropriate breeding programmes in order to maintain the genetic quality and its further improvement are yet to be introduced in most of the seed farms and hatcheries. Seed collected from natural resources are now used mainly for raising broodstocks with the objective of improving / maintaining the genetic quality of native major carps. Significant development in this regard is the development of an improved rohu popularly known as Jayanti by Central Institute of Freshwater Aquaculture (CIFA) through a long-term programme of genetic selection. Seed certification guidelines have been circulated by the GoI that include certain pre-requisites for certification of hatcheries and other regulations and the same needs to be implemented in UP. The National Fisheries Development Board (NFDB) has set up a national brood bank near Bhubaneshwar for fish seed self-sufficiency through decentralized fish seed production and makes year-round availability of adequate seed of desired quality and size. Similarly, a state level brood bank is also required for UP to cater to the need of the growing number of hatcheries in the state with pure line brood stock.

B. Inadequate application of formulated Fish Feed:

With growing fish demand, ensured supply of quality fish feed with good FCR is a prerequisite for improved fish production. Fish feed is an expensive but key input which is the driving force for better fish yields. Yet most fish farmers don't use fish feed for their captive fish stock and instead dependent on the natural food available in ponds, hampering the expected fish yield. Different kinds of formulated feeds are required at different stages of the fish life cycle with different protein percentage composition. Starter, grower, booster and finisher varieties of formulated feeds with good FCR are recommended for semi- intensive and intensive fish culture with protein content and other ingredients of carbohydrate, fat, minerals, vitamins, fibres and moisture in a balanced composition. The use of formulated feed in UP is in a very rudimentary stage because of its high cost for the poor and marginal fish farmers and a lack of awareness and perception amongst many fish farmers that are financially well-off but not habituated to using fish feed.

3. Vast and varied unutilized/underutilized fish resources:

Inland fisheries resources such as waterlogged areas & flood plains including ox-bow lakes are extensively available in Tarai, Central and Eastern zones of the state while most of the reservoirs are located in the seven districts of Bundelkhand region & Vindhyachal division (1.40 lac hectare). Perennial irrigation canals are available almost in all aqua-ecological zones of the state. These huge resources are lying grossly underutilized and certain resources are yet to be utilized. Aquaculture resources include about 1.61 lac ha of community ponds and about 12,000 ha of private ponds. Ponds are available in all zones of the state with relatively higher concentration in Tarai, Central and Eastern zones. Out of these only about 40 percent of community ponds are being utilized for aquaculture, that too with the application of minimal inputs. Except for a few progressive farmers and entrepreneurs who follow better farming practices, other ponds are largely used for stocking of seed and harvesting before the next season.

4. Lack of capacity building, training and handholding:

Inadequate human resources' capacity development in fisheries is one of the main reasons for under development of aquaculture and fisheries in UP. Capacity building and training play the key role in supporting sustainable development and needs to be a high priority area of focus in UP. This is particularly important keeping in mind the development of new approaches in fisheries management and significant advancements and changes nationally and internationally in recent years such as :

- A greater awareness of the need for cross-sectoral integration
- The information and communication revolution
- Development of technologies at a faster pace
- Growing concerns about resource sustainability

- Fair deal to resource user communities

Fisheries management practices require enhanced skills and human capacity. Besides, failure of fisheries management is usually due to a lack of sufficient consultation with fishing communities or analyses of social, economic and political aspects that interact to influence levels of compliance.

Training is important for capacity development of all stakeholders involved including the service providing agency and the primary producers of the sector – farmers and fishers. There is a greater recognition of the importance of participation by fishing communities and resource users themselves in the management of resources, through co-management approaches. This requires that fishing communities acquire new levels of capacity to meaningfully participate in such a management process, define management objectives as well as how these objectives might be achieved.

5. Weak marketing infrastructure and post- harvest management:

Currently Uttar Pradesh is a fish deficit state and hence the entire fish production is used for domestic consumption. Besides low per capita availability of fish in the state, fish consumption is also relatively low. Fish is a highly perishable commodity which needs immediate arrangement for preservation. Lack of adequate and hygienic fish marketing infrastructure and cold chain in the transportation of fish and fish products in UP is responsible for undue loss of fish produce and low consumption of fish due to less availability. It is estimated that nearly 30% of fish produce is lost due to poor post- harvest management and lack of market accessibility. Availability of clean and hygienic supply chains and domestic markets is important for attracting consumers and increasing the acceptability of fish consumption. Apart from ensuring nutritional and food security, this would also help in minimizing post- harvest losses, creating more jobs and raising higher level of food quality and safety standards.

Women in Agriculture

Women farmers play an important role in the agriculture sector and development of rural economy. Agriculture, the single largest production endeavour in India and contributing substantially to the GDP, is increasingly becoming a female activity. Agriculture sector employs 80% of all economically active women; they comprise 33% of the agricultural labour force and 48% of self-employed farmers. Women play a significant and crucial role in agricultural development including, main crop production, livestock production, horticulture, post-harvesting operations, agro/social forestry, fishing etc.

Challenges Faced by Women in agriculture sector

a. Lack of Land Resource

- Despite their significant contributions, women often face challenges in accessing agricultural resources such as land, credit, and technology and many agriculture schemes of the govt. Land ownership remains a major constraint for women in several parts of the country.
- Census 2011 also has reported low employment participation rate for Indian women in agriculture,
- Despite their significant contributions, women own only about 13% of agricultural land in India, according to the National Sample Survey Office (NSSO) data.
- It is high time to recognize that the work participation of the different categories of women engaged in the farming is largely uncounted due to inadequate definition of farmers adopted under census and NSS.

b. Lack of access to credit facilities

- Women in agriculture face numerous challenges, including limited access to credit.
- Access to credit remains a challenge, with only 6-7% of agricultural credit disbursed to women farmers, limiting their ability to invest in inputs like seeds, fertilizers, and machinery.
- Gender discrimination in credit markets makes it more difficult for women farmers to acquire labor-saving and innovative production inputs. This can impede women's participation in out grower schemes, although some investors facilitate credit access.

c. Low Wages

- The wage differentials between men & women being averse to them because they lack facilities of extension services being non land holders.

d. Poor Access to training, improved tools and agri-extension services

- Lack of proper training and extension services, and social norms that often restrict their mobility and decision-making authority.
- Women in agriculture face limited access to agricultural extension services (less than 5% receive training), inadequate infrastructure, and farm machinery.
- Lack of efficient drudgery reducing women friendly equipment.

e. Lack in Decision Making

- Studies indicate that women's involvement in decision-making processes related to agricultural activities varies across regions and communities. In some areas, women actively participate in farm-related decisions, while in others, traditional gender roles may limit their role in decision making.
- In states like UP, Punjab and Haryana, patriarchal norms often limit women's involvement in farm-related decisions.

Opportunities Available for Women Farmers

a. Subsistence Farming

- Many women in rural India are involved in subsistence farming, cultivating small plots of land for household consumption. They grow a variety of crops, including vegetables and fruits, to meet the nutritional needs of their families.
- Approximately 80% of women farmers in India are engaged in subsistence farming, cultivating small plots of land (less than 2 hectares) primarily for household consumption.
- Women are responsible for producing 60-80% of the food crops consumed domestically, emphasizing their critical role in ensuring food security at the household level.

b. Post Harvest Activities

- Women are extensively involved in post-harvest activities, contributing to 70% of the labor in sorting, cleaning, and processing agricultural produce like grains, fruits, and vegetables. They also play a crucial role in storage and marketing of agricultural products.
- The government has implemented various schemes and initiatives to empower women in agriculture. These programs focus on providing financial support, training, and resources to enhance the productivity and income of women engaged in farming and allied activities.

c. Government Schemes:

- The Government of India has launched several initiatives to promote women's empowerment in agriculture, including the Mahila Kisan Sahakian Pariyojana (MKSP) and the National Rural Livelihood Mission (NRLM).
- Under the MKSP, over 10 million women farmers have been organized into self-help groups, providing them access to credit, training, and market linkages.

d. Technology Adoption:

- There is a growing emphasis on promoting the adoption of modern agricultural technologies among women farmers. This includes training them in the use of improved seeds, organic farming practices, and efficient water management techniques

- Despite advancements in agricultural technology, women farmers have limited access to mechanization, with less than 2% owning farm machinery and equipment.
- Efforts are underway to promote gender-responsive agricultural technologies, focusing on improving women's access to labor-saving devices like seed drills, water pumps, and post-harvest machinery.

e. Legal Reforms:

- Legal reforms, such as the Hindu Succession (Amendment) Act, 2005, have sought to address gender disparities in landownership by granting equal property rights to women. It has sought to address gender disparities in landownership by granting equal property rights to women. However, implementation remains a challenge due to cultural and social barriers.

National Policy on Farmers, 2007 has included "mainstreaming the human and gender dimensions in all farm policies and programmes" as one of the major policy goals. Accordingly, Gender Mainstreaming initiatives are being promoted in the Department of Agriculture, Cooperation & Farmers Welfare (DA&FW), Ministry of Agriculture & Farmers Welfare, by way of building their capacities and improving their access to inputs, technologies and other farming resources. Mainstreaming of gender concerns is being addressed by (i) earmarking 30% of funds for women under various major schemes/programmes and development interventions; (ii) taking pro-women initiatives to help women derive the benefits of beneficiary–oriented components of various programmes/ schemes and missions. Focus is also being given on formation of women Self Help Groups (SHGs), capacity building interventions, linking them to micro credit, enhancing their access to information and ensuring their representation in decision making bodies at various levels.

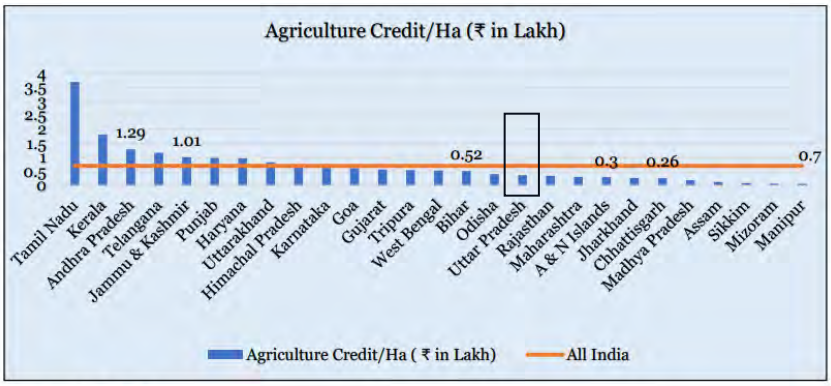
To fulfil the mission of gender mainstreaming in UPAGREES Project formation of 30 percent of the total FPGs of women FPGs have been targeted. Under this social inclusion and gender mainstreaming component, all gender related activities and issues will be addressed. Project aims at forging effective functional linkages with other related departments, agencies and institutions for women empowerment.

Access to Finance

There is a range of challenges that smallholder farmers in Uttar Pradesh face in terms of accessing finance for their agriculture production, harvesting and marketing as outlined below:

- **Low per hectare credit:** Only Rs. 0.5 lakh worth credit was available per hectare in Uttar Pradesh in 2019-20, much lesser than other agricultural states such as Punjab and Andhra Pradesh.

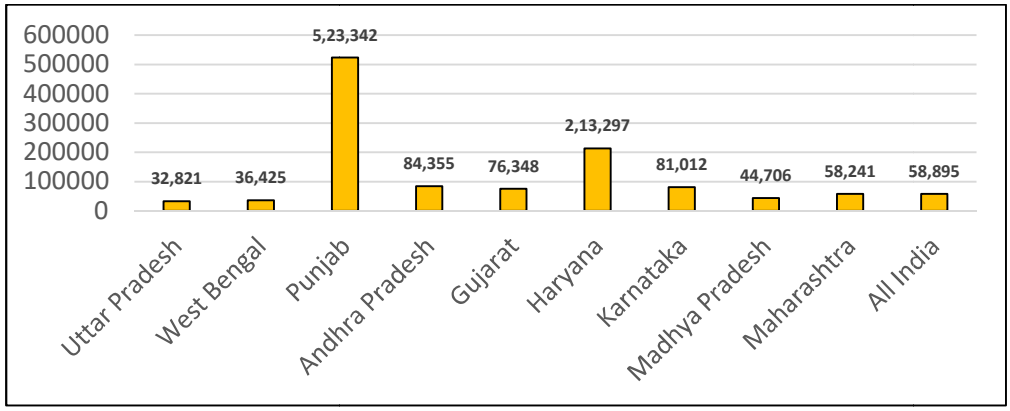
Figure 9: Agriculture Credit per Ha (in Rs. lakhs)



Source : NABARD

Additionally, the average amount of loan disbursed per account was less in Uttar Pradesh as compared to all India, both for all farmers and small and marginal farmers (FY 2019-20).

Figure 10: Average amount of loan disbursed per account



- **Stagnant Contribution of Agri Credit to State GDP:** Despite a continuous increase in agricultural credit per hectare of gross cropped area, agriculture credit's contribution to Uttar Pradesh state GDP and gross value added have been stagnant over the last 5 years.

Table 6: Agricultural Credit Contribution to State GDP

(Current Prices)

Year	Agricultural Credit/GSDP (%)	Agricultural Credit/AgGSVA (%)	Agricultural Credit/ GCA (Rs/ha.)
2011-12	5.43	31.66	15431
2012-13	5.71	31.39	18179
2013-14	5.98	34.60	21709
2014-15	7.35	47.59	28453
2015-16	7.74	49.94	33686
2016-17	7.39	49.75	36443
2017-18	7.26	50.65	39458
2018-19	6.27	44.76	38938
2019-20	6.54	47.87	43718

Source: Handbook of Statistics on Indian States (2019-20), RBI, State Focus Paper 2021-22, NABARD, Uttar Pradesh RO, Lucknow.

- **Lagging long-term credit:** The share of agricultural credit in total priority sector lending (PSL) fell from 63.73% to 58.47% between FY 2009-10 and FY 2019-20 even as PSL lending increased in Uttar Pradesh.

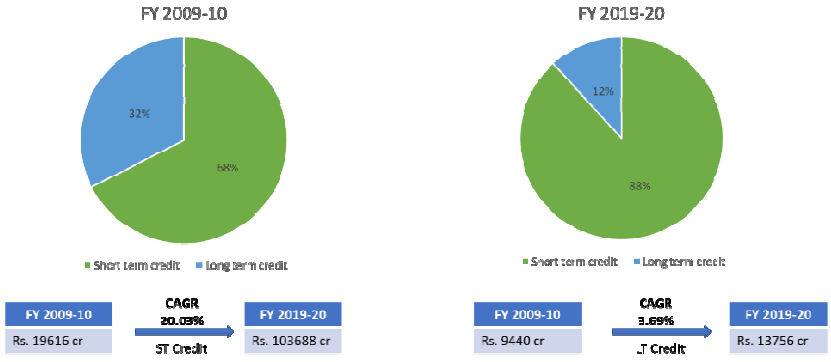
Table 7: Share of agri credit in priority sector lending in UP (in Rs. crore)

Particulars	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	CAGR (%)
Commercial Banks	18936	22373	25709	31821	36756	48251	57157	66947	71116	72502	80051	16.60
RRBs	6927	7972	9431	10265	14696	18884	22971	21914	27180	26940	30182	17.10
Coop Banks + Others	3192	3896	4165	4855	4766	7262	7951	6427	7706	5161	6111	6.85
All Agencies (Agriculture Credit)	**29056**	34241	39305	46941	**56219**	74397	88079	95288	106002	**104602**	116344	15.91
Short term Credit	19616	21024	25549	31854	41375	55609	71042	75998	90639	87006	103688	20.03
Long Term Credit	*9440*	*13217*	*13756*	*15086*	*14844*	*18788*	*17037*	*19290*	*15363*	*17596*	*13756*	3.69
Total Agriculture Credit	**29056**	**34241**	**39305**	**46941**	**56219**	**74397**	**88079**	**95288**	**106002**	**104602**	**117444**	15.96
Non-Farm Sector (MSME)	9071	11461	10824	13248	19249	22440	22996	28137	46595	57809	71080	23.07
Other Priority Sector	7468	7133	8242	8663	10242	12381	12110	14026	15015	11699	12332	6.98
Total Priority Sector	**45594**	**52835**	**58371**	**68852**	**85711**	**109218**	**123185**	**137451**	**167612**	**174110**	**200856**	**16.81**

Source: State Focus Papers, NABARD, UP ROLucknowand SLBC, UP.

Scarcity of long-term credit affects capex growth in the agriculture sector. The share of short-term agricultural credit is considerably higher than long term agricultural credit indicating that investments and capital formation in agriculture is not happening adequately.

Figure 11: Share of short-term and long-term credit in agriculture sector UP



- **Poor Credit-to-Deposit ratio:** In 2022, the Credit-to-Deposit ratio for Uttar Pradesh was 46.40 per cent, lower than all India C-D ratio of 78.30 per cent and of other states like Madhya Pradesh (70.4 per cent) and Maharashtra (77.8 per cent)[11]. Additionally, the C-D ratio in the state varies greatly across districts whereby 37 out of 75 districts had a C-D ratio of less than the state average e.g. Azamgarh (20.11 per cent) vs Sambalgarh (88 per cent). Though State's CD ratio has reached 60% in recent years(2023), however it is still much below from better performing states like Andhra (157.81%),Maharashtra (101.72%) and Gujrat (82.66%).

Table 8: C-D ratio in Uttar Pradesh districts

No.	Project Beneficiary Districts (C-D Ratio)	
1	Jhansi	43
2	Lalitpur	77
3	Jaluan	49
4	Banda	51
5	Chitrakoot	52
6	Hamirpur	68
7	Mahoba	59
8	Mirzapur	45
9	Sonbhadra	40
10	Bhadhohi (SRN)	40
11	Varansi	38
12	Ghazipur	27
13	Chanduali	40
14	Jaunpur	25
15	Gorakhpur	41
16	Deoria	30

No.	Project Beneficiary Districts (C-D Ratio)	
17	Maharajganj	47
18	Kushinagar	37
19	Basti	40
20	Siddtharthana	31
21	Santkabir Nag	36
22	Azamgarh	20
23	Mau	28
24	Ballia	33
25	Gonda	48
26	Balrampur	49
27	Baharaich	67
28	Shrawasti	65
Project Area Average		**44**
UP Average		**52**
National Average		**78**

[11] https://www.thehindubusinessline.com/money-and-banking/credit-deposit-ratio-of-northern-and-western-regions-declined-in-2022-rbi-data/article66165033.ece

Digital Agriculture Ecosystem

A Digital Maturity Assessment revealed significant scope for improvement in UP's digital architecture for agriculture

Figure 12: Uttar Pradesh Digital Maturity Assessment

The analysis of the sectoral context and state of implementation of electronic public service delivery measures in Uttar Pradesh reveals a complex web of challenges faced by farmers, including lack of climate-smart agricultural advice, crop information, market information, access to market linkages and supply chain networks, and lack of connectivity. Moreover, the digital service delivery infrastructure at the state, district and village level is inadequate. The allied departments such as dairy, fisheries, and livestock farming also face challenges with fragmented online service delivery systems offering very few Government to Citizen (G2C) services limited to availing government benefits. The digital literacy among small scale farmers is low, connectivity in rural areas is poor, and state backed e-commerce and e-trading platforms for selling agricultural products are negligible in Uttar Pradesh. See Annexure 1 for a detailed list of Challenges and Opportunities in the Digital Agriculture Ecosystem.

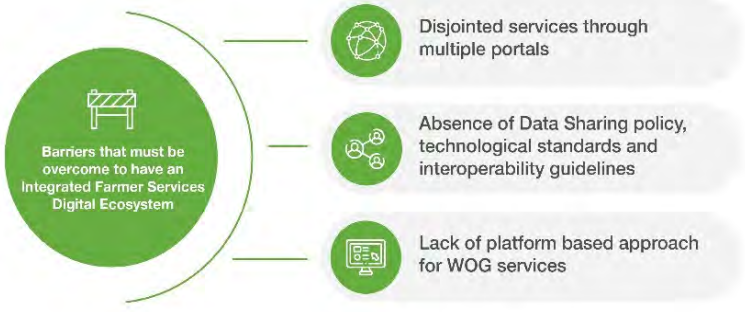


Figure 13: Barriers to an Integrated Farmer Services Digital Ecosystem in UP

Project Development Objective

"To improve climate resilience and commercialization of the agrifood systems."

Key Performance Indicators

Key Project performance indicators are as under:

a. Project beneficiaries adopting climate smart practices (Number)
b. Increase in average annual yield of select crops (Tones/hectare)
c. Increase in profitability at the producer level (Percentage)
d. Private capital enabled (US$ million)

The Guiding Principles

The guiding principles of the project are:

(i) Adoption of climate resilient technologies to optimize agriculture productivity of selected commodities in low performing areas.
(ii) Focus on cluster-based approach to bring forward state's comparative advantage to meet the growing domestic, national and international demand for agriculture output.
(iii) Market-led investments and finance to orient agriculture and food system towards commercialization based on market intelligence.
(iv) Increase private sector participation in agriculture supply chain and marketing, and to create employment opportunities.
(v) Enable small holder farmers to benefit from improved access to technology, markets and finance/credit, thereby increasing farm income.
(vi) To utilize and build upon the existing institutional capacity in the state by developing strategic partnerships to bring cutting edge technology to the sector,

The project is aimed to support value addition in the production and post-harvest management of selected value chains; facilitate agri-business investments through inclusive business models that provide opportunities to small farmers and enable establishment of new agri-business; and support resilient agriculture production system in project area. The project would adopt a cluster strategy, to generate economies of scale; promote vertical and horizontal link between local enterprises. By adopting a cluster approach, the project would enable all the value chain participants to develop competitive and quality products that will meet /match market demand.

The project aims at transformational impact on rural poverty through improved agricultural productivity, value addition, higher non-farm employment opportunities and increased farmers income. It will allow easy inclusion of marginalized farmers in growth process. One of the important outcomes of the project will be enabling scale of economy, storage, processing and marketing of agriculture produce. Technology dissemination, improved post-harvest management/value addition and better market linkages will be the core thrust areas.

Project Design

The proposed project aims to address the existing challenges in UP agriculture and allied sectors. The conceptual approach to achieve the project development objective is anchored on four interrelated goals:

(i) Support productivity increases in staple crops (including rice and wheat) cultivated by a majority of farmers, through improved access to inputs and the efficient use of natural resources potentially reducing emissions. This would be conducted in the project areas which have relatively low productivity;

(ii) Demonstrate approaches to transform the sector into higher-value produce and value chains through the concept of agro-clusters, which will take a market-led approach to developing the ecosystem to support selected crops to become major drivers of economic growth in the project districts;

(iii) Development of digital architecture to support (state-wide) the efficient delivery of services, improved e-commerce, and standardization of data collection and analysis;

(iv) Strengthen the ecosystem for increasing access to financial services for project beneficiaries and micro and small enterprises (MSEs) to enable and leverage private-sector investments.

Project Districts and Beneficiaries

As Eastern UP and Bundelkhand are two economic regions that lag behind the rest of the state in agriculture, the "UP Agriculture Growth and Rural Enterprise Ecosystem Strengthening" (UP-AGREES) project, will focus attention on 28 districts in these two regions.

The identified project districts are**:**

Figure 14: UP-AGREES Project Districts

The direct project beneficiaries are (i) small and marginal farmers; (ii) fishers; and (iii) micro and small entrepreneurs. The project will support one million beneficiaries in all. Specifically, the project will support 125,000 farmers and fishers through structured cluster-level interventions.

The project will target the participation of women across all project interventions. At least 40 percent of farmers supported by the project will be women, and 5,000 exclusive women FPGs will be supported. In addition, the project will make concerted efforts to include marginalized communities, such as farmers belonging to Scheduled Castes and Scheduled Tribes.

Job opportunities will be created for both women and youth as well as business opportunities for micro, small and medium enterprises (MSMEs). It is estimated that the project will benefit farming households directly and indirect beneficiaries will be those who will be benefited by the technology demonstrated in the project. At least 30 per cent farmers of the project district are expected to be project beneficiaries.

Secondary beneficiaries include (i) farmers obtaining digital KCCs and other financial services due to project interventions at the policy level, (ii) farmers obtaining improved services due to the development of digital platform; and (iii) proposed partner institutions with the mandate to promote climate-smart practices, strengthening value chains etc.

Project Components

The Project "UP-AGREES" has three major components;

Component 1: Productivity Enhancement	• **Sub-Component 1A**: Resource-use Efficiency • **Sub-Component 1B**: Seed Systems • **Sub-Component 1C**: Agri-Extension • **Sub-Component 1D**: Leveraging Carbon Markets
Component 2: Commodity Clusters	• **Sub-component 2A**: Crop Clusters • **Sub-Component 2B**: Fisheries •**Sub -Component 2C:** Developing Export Hub
Component 3: Digital and Financial Ecosystems	• **Sub-Component 3A**: Digital Architecture and Technology Services • **Sub-Component 3B**: Agri Finance Ecosystem

In addition to the above the project has two more components as below:

Figure 15: UP-AGREES Project Components

Salient and Innovative Features of UP-AGREES Project

UP AGREES will focus on:

- **Climate-resilient agriculture:** Project will work towards increasing yields, enhancing farmer incomes, and reduced water and carbon footprints. It shall specifically focus on promoting late sowing early maturing (short duration) varieties.
- **Systems Approach:** Using sub-system analysis to identify specific interventions in order to optimize resource use and address crop productivity gaps. It will aim to promote regenerative agriculture and providing access to farmers to carbon credit markets.
- **Knowledge Partnerships:** The project will dovetail with existing technical expertise in the state and bring in national and global good practices. It will aim to send 500 farmers to different Countries on exposure visit to best practices.

- **Geospatial Technology:** Use of geospatial technologies in conducting diagnostics for ground truthing areas of challenges and opportunities in diverse agro-climatic zones. Issuing weather and price advisories.
- **Cluster Approach:** Establishing Agri special economic zones. The project will develop Agriculture Export Hub(Testing, Treatment, Packaging, Storage and Cold Chain infrastructure) near upcoming international airport Jewar. End-to-end solutions by creating an ecosystem of opportunities through Agtech and digital infrastructure in the farm sector.
- **Improving access to finance:** Market based models of financing using smart subsidies and risk sharing to attract private sector lenders as much as public sector lenders with focus on agriculture financing through a common digital public infrastructure model.
- **Digital Infrastructure:** UP will lead the way as the first state with a comprehensive digital agriculture policy, Enhanced Agri stack ++ and an Agriculture Data Hub as a digital public infrastructure (DPI) for multiple agencies.

Component 1: Productivity Enhancement

Background

UP's agriculture sector is poised to grow, building on the progressive policies of the State Government. However, the sector has been facing historical and systemic challenges as discussed earlier. These challenges are further exacerbated by climate change, gender and limitations in the existing infrastructure and institutional architecture in the State.

This component focuses on strengthening the agricultural productivity against the backdrop of high levels of climate risks and variability in productivity across the project areas. It focuses on strengthening Uttar Pradesh's formidable position as the leading producer of multiple agricultural crops while enhancing the resilience of the dominant production systems.

The component will create a scale-friendly template for the uptake of climate-smart agriculture (CSA) investments by way of: (a) prioritization of affordable agricultural inputs, machinery and technologies that boost farm productivity complemented by targeted extension services, (b) fortification of the production ecosystem targeting higher input efficiencies and soil fertility management, and (c) leveraging voluntary market-based mechanisms that seeks to secure emissions reductions or avoidance credits (carbon or green) for sustainable agricultural practices. The component will also align and leverage the gains created by the upstream technical assistance; the UP-Accelerator Program of the IBRD Trust Fund 2030 Water Resources Group.

Objectives

To address the existing productivity challenges through improved access to climate-resilient inputs, efficient use of natural resources, and fostering innovations that promote sustainability.

Guiding Principles

The project takes a measured approach and acknowledges that it is extremely difficult to develop a single framework for climate-resilient agricultural practices for different agricultural landscapes. Inspired by the principles of Climate Smart Agriculture (CSA) outlined by Food and Agriculture Organization (FAO), UP-AGREES proposes following guiding principles framework.

Figure 16: Principles of climate smart agriculture (CSA)

Enhanced agricultural productivity while adapting to climate change and preserving the natural resources and vital ecosystem services calls for a transition to agricultural production systems that are more responsive, input efficient, and climate resilient. Climate-Smart Agriculture (CSA) aims to sustainably enhance food security, improve incomes, foster resilience, and focus on regenerative agriculture. Holistic approaches like climate-resilient agriculture ensures sustainability and adaptation to climate variability and increased productivity..

Efficient use of water, soil and energy resources plays an important role in addressing climate change concerns. Development and management of water resources need to be undertaken in a manner such that water wastage is minimized through proper conservation to ensure equitable distribution. Scalable and affordable water management solutions like harvesting rainwater and groundwater, wastewater reuse etc. can build resilience and have a major impact on climate change. Improving soil health through Sustainable Soil Management (SSM) to enhance soil organic carbon, nutrient balance, and soil biodiversity for improving soil health should be encouraged and incentivized.

Supply side interventions including access to quality seeds mentioned above can help transition the food systems to greener and sustainable pathways. However, it is important to achieve a balance between supply and demand-side factors to ensure sustainable production and consumption. Efficient use of resources in agriculture can help charter a lifestyle-driven pathway to sustainability.

Enhanced resilience through CSA approach requires multilateral collaboration involving all stakeholders and engaging vulnerable communities in policy reforms. Enhancing the access to value chain financing for adoption of market-driven and climate-smart technologies in production and post-harvest processing can maximize profits, while achieving resilience for small farmers. Promoting public and private research, innovation and exchange of knowledge and best practices in sustainable agriculture will significantly strengthen the efforts to tackle climate change.

Enhanced farm services to farmers will raise the productivity levels by focusing on making available better services for improved productivity. UP AGREES is developing tools to help small farmers make sound farm-decisions including choice of the right levels of high-quality inputs and farm advisories that will better meet the needs of highly diversified producers, particularly small and marginal producers in rice-wheat dominated landscapes and fruit and vegetable growers in Uttar Pradesh. Private sector-Community partnerships can help engineer profitable and inclusive strategies that enable smallholders to lift themselves out of poverty by improving farming and business practices. The UP AGREES strategy offers last-mile delivery solutions to help smallholder farmers become sustainable, commercially viable suppliers of agricultural products. The range of service options at the last-mile will be prioritized based on context-specific requirements based on gap analyses done in partnership with the private sector and civil society.

The project approach recommends a basic structure of climate-smart agriculture that includes a focus on **improving resilience** to climate risks and shocks, **increasing the adaptive capacities** of farmenrs, and finally widespread **adoption of sustainable production** practices that focus on higher resource-use efficiencies, good management and governance practices based on a systems approach, and an inclusive multi-stake holder and multi-sectoral environment for greater coordination in production, processing and marketing.

This approach calls for a paradigm shift in achieving and enhancing sustainability in agricultural production landscapes, moving away from project-level actions to coordinated, multi-stakeholder interventions targeting **inter-linked system-level sustainability outcomes** with focus on regenerative agriculture practises

To achieve these objectives in the 28 project Districts of Eastern UP (21 districts) and Bundelkhand (7 districts) regions, Component 1 shall focus on the following activities and 3 subcomponents.

Sub-Component 1A: Resource-use Efficiency

Low agricultural productivity in Bundelkhand and in the Eastern region in Uttar Pradesh is attributed to small land holdings, poor soil fertility, reduced productivity, limited input supplies, high cost of cultivation, and inefficient resource utilization.

This sub-component focuses on a systems approach to bring about a substantial and sustained increase in agricultural production. Guided by diagnostics that identify scale inhibitors and replication barriers impacting agricultural productivity, this sub-component will benchmark and achieve 'optimum' levels of agricultural productivity in distinct smallholder cropping systems. The project will also explore complementarities with the UP-Micro Irrigation Project (UPMIP) for promoting and monitoring water-use efficiency (WUE). Specifically, this sub-component will work on:

(i) Organizing farmers into Farmer Producer Groups (FPGs). Further, the project will support development exclusive women-led and women-owned FPGs.

(ii) Increasing Rice Wheat Cropping Systems (RWCS) productivity in Eastern UP by addressing the degradation of soil and water resources and the declining system-yield due to exhausted resource base and adverse effects of climate variability. This will involve knowledge-based interventions (such as improved service delivery using targeted extension services, public-private partnerships), and technology-based interventions that boost soil-system productivity such as investments in land preparation, laser land levelling, direct seeding, soil fertility management, and WUE.

(iii) Optimizing Smallholder Rainfed Production Systems (SRPS) in Bundelkhand by promoting risk-mitigation strategies including market-driven crop diversification and investments that promote controlled, high-efficiency irrigation and nutrient management, tailored agronomy, and utilization of abandoned agricultural fallows. Investments will also be made to rehabilitate and restore ecological functions of landscapes by focusing on 'optimum agricultural production' in selected land parcels[12].

(iv) Adopting a sustainable mechanization approach to maximize productivity and increase resource use efficiency[13]. Focus will be on improving smallholder farmers' adoption of mechanization by encouraging peer to-peer rental of farm machinery, through Custom Hiring Centres, to improve utilization.

[12] Each 1percent increase in soil organic matter helps our soils hold 150 m3 more water per hectare.
[13] Adoption of farm machinery has the potential to increase productivity up to 30 per cent and reduce the cost of cultivation up to 20 per cent (savings from labour and agri input usage).

(v) Promoting micro irrigation and fertigation to increase water and nutrient use efficiencies. Focus will also be on improving soil fertility and soil health management practices in the target value chains and regions. This will reduce GHG emissions and improve AQM through reducing methane and nitrous oxide which contribute to PM2.5 pollution and impact air quality.

The project will support eligible farmers to accelerate the adoption of demonstrated technologies and agronomic practices.

1A.1 SOIL PRODUCTIVITY-FERTILITY SUB-SYSTEM

Under this sub-component, the project will assess essential features and integrate functionalities of the sub-systems to contribute to building a productivity alliance to achieve desired outcomes.

Table 9: Soil productivity-fertility sub-system

System	Features
1. **Soil Productivity System**	Nature of Soil, Type & Depth, Physical Properties, Chemical Composition, and Productivity Potential.
	Soil Organic Content, Micro-biome, Water-holding Capacity
2. **Soil Fertility System**	Soil Carbon, Essential Nutrients Status (Soil Health Card), Soil Colour (e.g., Black, Red etc).
	Soil Nutrient Stock, Nutrients Assimilation Conditions for Crops, Soil pH and Soil Electrical Conductivity.
3. **Productivity-Fertility System***	Nutrient Deficiencies and Excess, Nutrient Imbalances, Soil Amendments (e.g., Gypsum)

**No two soils are alike. Black soil is different from Red in its productive potential. Often discounted, such features are documented and assessed at KVK levels.*

Below is the generic list of interventions available to get the productivity-fertility sub-system in order to support desired level of crop productivity under different soils. The project will develop and disseminate advisories on the potential and constraints in the sub-system, which will also be digitised for online reference.

Soil health improvement practices shall be intensively implemented in all 28 project districts and will comprise of interventions that will enhance soil organic carbon, increase availability of essential nutrients, and improve water holding capacity of the soil leading to reduction in carbon emission from the soil. This will be achieved through a package of following activities:

1A.1.1 Baseline Soil Testing

Deficiencies of primary, secondary and other micronutrients are observed in all the districts of the state, particularly in intensively cultivated areas. Fortunately, Uttar Pradesh has made commendable progress in creating soil testing facilities, popularising the programme in a campaign mode.

Through UP-AGREES, complete soil testing of every 5 hectares will be conducted in the first year of project implementation following which Soil Organic Carbon in subsequent year will be monitored. The project teams will:

- based on the physical appearance of the soil, the field level technical assistant (TA) will draw geo-referenced soil samples from a 5 hectare grid from the project areas.
- orient the farmers regarding the benefits of soil test
- mobilize the farmers in collection of the soil samples
- the soil samples so collected will be properly tagged with desired details and transported to the DPIU office.

A technical Support Organization (TSA) shall be engaged for testing. The selection of the TSA will be through competitive bidding. The TSA engaged will be responsible for:

- transporting the soil samples from the DPIU to their laboratories for analysis
- providing the results of the soil samples along with soil health cards for each grid
- providing the details of grid and village wise test results along with recommendations in an excel sheet

Based on the results and recommendations of the soil testing, the farmers will be advised to adopt balanced use of fertilizers and manure to get optimum yield per unit area.

Table 10: Soil analysis targets and proposed cost (Tentative Estimation[14]) of analyses

Sr. No	Component	Unit	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	Total
1	Project Area	Ha	17500	200000	240000	-	-	-	615000
2	Soil Samples	No.	35000	40000	48000	35000	40000	48000	246000
3	Soil Sample collection charges @ (Rs 20/sample)	lakh Rs	7	8	9.6	7	8	9.6	49.2
4	Soil sample analysis and reporting Cost (Rs. 180/sample)	lakh Rs	63.00	72.00	86.40	63.00	72.00	86.40	442.80
	Total Cost in Rs lakh		**70**	**80**	**96**	**70**	**80**	**96**	**492.00**

1A.1.2 Green Manuring

Green manures are crops grown within a crop rotation for the purpose of building soil organic matter and improving soil structure, supplying nitrogen and other nutrients while preventing leaching of soluble nutrients from the soil, reducing chemical fertilizer use and promoting soil carbon sequestration.

Green manuring will be taken up in the entire project area of 6.15 lakh ha across 28 districts whereby farmers will be provided 40 kgs Dhaincha (Sesbania aculeata) seeds/ hectare in the first year of their project activities (the procurement of Dhaincha will be done

[14] The proposed cost is a tentative preliminary estimation and may be revised and modified while implementing the project.
(NOTE: cost estimation proposed under various heads /items in this chapter and document are only for estimation and planning purpose. These may be revised and modified while implementing the project)

by the project). It is expected that the farmers will sow Dhaincha by the end of April and after 45 days overturn the soil with 1-2 irrigations. Dhaincha adds almost 60 to 70 kg N in the soil and enhances microbial activities in it.

In Bundelkhand, it is well known that there is water scarcity and Green Manuring can't be taken up during the summer season. As only 45 percent of the net cultivated area is covered during the Kharif season, the project will introduce green manuring in Kharif season in areas where farmers are not taking Kharif and directly going for Rabi crops. This will also increase crop coverage in Kharif while reducing evaporation from the soil and increasing transpiration rate.

Farmers shall also be encouraged to take up **Dhaincha seed production**, so that it's seed could be easily made available from second year onwards at reasonable rates. Dhaincha seed production programme can become a major project activity in subsequent years. Year wise requirement of Dhaincha seed and tentative cost for UP-AGREES is given in the following table.

Table 11: Year-wise requirement of Dhaincha seed and cost[15]

Sr No	Component/ year	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	Total
1	Area (lakh ha)	1.75	2.00	2.40				6.15
2	Dhaincha Seed Requirement (Q)	70000	80000	96000				246000
3	Cost of Dhaincha Seed @ Rs.7000/Q (Rs in lakh)	4900	5600	6720				17220
4	Handling cost @ Rs 100/Q (Rs in lakh)	70	80	96				246
6	Total Amount	4970	5680	6816				17446

The Dhaincha seed will be centrally procured by the project and distributed to the target farmers involving the FPOs and FPGs.

1A.1.3 Soil Amendments (gypsum)

Sizable area will be taken up under oilseeds and pulses in UP-AGREES. There is a wide spread deficiency of sulphur in almost all the project districts of UP-AGREES. Therefore, in order to enhance productivity of oilseeds and pulses, an application of gypsum as a soil amendment @3 quintals/ha for oilseeds and pulses has carried out.

In cereal crops, 2 quintals of gypsum/ha will be applied. Gypsum application will also help in improving soil aeration and water percolation through soil profile.

Table 12: Year-wise gypsum application requirement and cost

Sr No	Component	Unit	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	Total
1	Project Area	ha	175000	200000	240000	-	-	-	615000
2	Gypsum Requirement	MT	17500	20000	24000				61500
3	Cost of Gypsum @ Rs. 5500/MT	Rs lakh	962.50	1100	1320				3382.50

4	Handling cost @ Rs 1000/MT	Rs lakh	175	200	240				615
5	Total Amount	Rs lakh	1138	1300	1560				3998

Gypsum will be centrally procured by the project and distributed to the target farmers involving the FPOs and FPGs.

1A.1.4 Crop Residue Management (CRM)

Soil crop residue management (CRM)[16] improves soil productivity and crop production by maintaining soil organic matter (SOM). Soil carbon could be increased by the application of organic and green manures and the recycling crop residues of common agricultural crops in the soil. Further, carbon sequestration through enhanced CRM is a cost-effective option for minimizing agriculture's impact on environment.

UP-AGREES will take up CRM practices in the entire project area of 6.15 lakh ha/ ~ 8.32 lakh famers across 28 districts in a campaign mode "*Khet Ka Avashesh Khet Mei"* in order to have a positive impact on the environment. Farmers shall be encouraged to collect and mix green waste and brown waste along with layering[17] of animal dung in order to improve C:N ratio for ideal composting.

Good CRM will lead to many benefits such as at farm availability of quality and enriched manure from the crop and animal residues, improvement in physical, chemical and biological properties of the soil, quality crop products, increase in SOM and soil biodiversity, reduced carbon emission, improved soil structure, increased water holding capacity, improved soil aeration, enhanced drainage.

The FPGs will be encouraged to practice in-situ CRM for which the project will procure the waste decomposers and provide it to the FPGs. Each FPG will be provided with the bio-decomposer and a grant of Rs 750/ha as an incentive for in-situ incorporation of crop residue through soil turning equipment which can be hired from the custom hiring centres (CHCs)/ Farm Machineries Banks (FMBs). Required technical support will be provided by the project team.

Table 13: Year-wise CRM implementation and cost (Rs in lakh)

Sr No	Component	2024-25	2025 -26	2026-27	2027-28	2028 - 29	2029 - 30	Total
1	Project Area (lakh ha)	Preparatory phase	1.75	2.00	2.40	Follow up	Follow up	6.15

[16] Two major benefits of crop residue management are: increased organic matter near soil surface and enhanced nutrient cycling and retention. Greater microbial biomass and activity near the soil surface acts as a reservoir for nutrients needed in crop production.

[17] Alternating layers of carbon rich and nitrogen rich material with inter mutant layers of animal dung are essential while forming heaps of soil crop residue. Once the heaps are formed, the material is thoroughly moistened, and a waste decomposer slurry made of 1 to 2 kg of bio mineralizer (waste decomposer) mixed with 20 litres of water is added to the heaps. This slurry can be maintained and used year after year. Aerating of compost material expedites the composting process.

The cost of bio-decomposers has been included in the bio-fertilizers cost item. The bio-decomposers will be centrally procured by the project and distributed to the target farmers involving the FPOs and FPGs. For more details on the process please refer to the section Input Distribution System and Process on pg. 65.

1A.1.5 Micronutrients

Micronutrients play a vital role in crop growth, crop productivity, soil fertility and human nutrition. Deficiency of micronutrients like Zn, Bo, Fe and secondary nutrients like Sulphur etc. in the soil will be addressed through a balanced fertilization schedule that would optimize micronutrient supply and their availability in the entire food consumption cycle. Assistance shall be provided to farmers, based on soil testing results and the crops taken by them, following are the provisions in cost table under Incr. O&M Category of Expenditure.

Table 14: Year-wise micronutrients requirement and cost

Sr No	Component	Unit	2024 -25	2025- 26	2026- 27	2027- 28	2028 -29	2029 -30	Total
1	Area	Lakh/ ha		1.75	2.00	2.40			6.15
2	Zinc Sulphate 33% Quantity @ kg/ha	MT	9225	2625	3000	3600			18450
3	Cost of Zink Sulphate @ Rs. 70000 / MT	Lakh Rs.	6457.50	1837.50	2100.00	2520.00			12915.00
4	Transportation/ Distribution/ Storage Costs @ Rs.1000 / MT	Lakh Rs.	92.25	26.25	30.00	36.00			184.50

The micro-nutrients will be centrally procured by the project and distributed to the target farmers involving the FPOs and FPGs. For more details on the process please refer to the section Input Distribution System and Process on pg. 65.

1A.2 Soil Input Efficiency Sub-System

Research has shown that only by striking a balance between productivity and fertility of soil can external inputs deliver the optimum results. For instance, a similar duration of rainfall on different soil will induce differing productivity performance. The sub-system assessment is critical in understanding soil response to inputs in creating near-perfect conditions for sustaining crop growth. Understanding soil response to inputs, both natural and artificial, is critical for engineering solutions that reflect resilience.

Table 15: Soil input efficiency sub-system

System	Critical Features
1. Soil-Water System	Soil Type, Soil Depth, Groundwater Level, Water-holding Capacity, Soil Temperature
	Soil Water Infiltration, Surface Flow, and Storage
2. Soil-Fertilizer System	Soil Test-based Fertilizer Application, Crop-specific Nutrient Demand, and Supply, Fertiliser Dose Response

	Nutrient Loss, Fertiliser Application Timings and Techniques (broadcast method, with irrigation waters etc).
3. Soil-Environment System	Regional and Local Climate Variables, Impact Factors on Crop Productivity,

Recent research has shown that soil-input performance system is subject to change with changes in temperature, precipitation, and level of atmospheric carbon-dioxide. Hence, to develop soil-input efficient system the project will focus on scaling up adoption of technologies and practices for efficient use of natural resources; land levelling and raised bed cultivation for efficient use of soil moisture for crop growth; and improving water-use efficiency and water productivity at the farm level. UP AGREES will make efforts to anchor water, nutrient and energy conservation practices to farm-level diagnostics that includes village-level Crop Water Budgets (CWBs) or align with the existing planning resources from other World Bank/MDB investments in the area, such as Atal Bhujal Yojana (ABY).

Based on this sub-system narrative, this sub-component will design practices that reduce soil water evaporation component by diverting more water into transpiration by affecting crop residue management, mulching, row spacing, and irrigation. Focused attention will also be given to bring more areas under controlled irrigation, promoting protected cultivation, converting abandoned agricultural fallows, promoting diversification of agriculture, and supplementing incomes of farmers through diversified livelihoods.

While the project will leverage existing central and state schemes enlisted below, the focus will be on adopting a system approach towards efficiency and effectiveness in performance of the soil-input system in terms of upholding its productive potential.

1A.2.1 Micro watershed approach in Bundelkhand

Bundelkhand region of UP has a semi-arid climate, faces scarcity of water and has poor soil quality all of which result in low crop productivity. The region's undulated topography with a large number of natural drainage lines result in draining the major portion of rain water out of the watershed. As rainfed agriculture is practiced in this region, conservation of soil and water is of prime importance.

Several Central and State government funded soil and water conservation schemes have been implemented in Bundelkhand region. Majority of the watersheds have been treated with Ravine stabilization and integrated wasteland management through schemes that have been implemented during the last 50 years. At present soil and water conservation works are being taken up under Pd. Deen Dayal Kisan Samridhi Yojna, Integrated watershed management programme (IWMP) scheme and Khet-talab (farm pond).

UP-AGREES will converge required land and watershed development activities with ongoing schemes of GOI/GOUP in selected project villages.

1A.2.2 Bunding and laser land levelling in Eastern UP

Eastern UP has predominantly alluvial soils with good depth and fertility. Rice, wheat and sugarcane are the principal crops of this region whose water requirement is very high. Due to intensive cropping over the years, declining water tables and degrading soil health have become major concerns for the productivity enhancement and sustainability of agriculture in this region. Thus, proper emphasis needs to be given to moisture conservation and management of irrigation water.

Field Bunding: The annual rainfall in Eastern UP ranges 1000-1200 mm causing flood situations almost every year. To conserve soil fertility and moisture; and increase ground water tables, field bunding will be promoted in the project. This will reduce the runoff of water and help impound water longer for it to infiltrate the soil.

The project will orient the farmers about the benefits of Bunding and farmers will be motivated and mobilized to construct / strengthen field bunds involving their own resources so that rain water is harnessed and atmospheric nitrogen coming with it can be fixed in the soil. This will also help in improving the groundwater status.

Laser Land Levelling: Water use efficiency, whereby farmers are trained to use irrigation water more efficiently, is a major activity that UP-AGREES plans to undertake. Laser Land levelling is one such important technology for using water efficiently and in reducing greenhouse gas emissions. Precision land levelling improves uniform application of water; betters the crop stands, helps reduce abiotic stress intensities and stabilizes yields through improved nutrient-water interactions. About 25 to 30% of irrigation water could be saved through this technique without having any adverse effect on the crop yield.

The member farmers of FPGs will be provided incentive for precision levelling of their lands @ Rs. 1000/ ha as a grant directly to FPG bank account for disbursement to beneficiary farmers. Laser land levellers are to hired by the farmers themselves from local CHCs/FMBs. Preference will be given to project created FMBs/CHCs for hiring equipment. Wherever needed, facilitation support will be provided to farmers through the project. Target area for this activity is 1.5 lakh ha (~25% of project area).

Table 16: Year-wise laser land levelling incentives

Sr No	Component	Unit	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	Total
1	Area	Lakh ha		0.40	0.50	0.60			1.50
2	Incentive to hire laser land leveller @1000/ha	Rs in lakh		400.0	500.00	600.00			1500.00

1A.2.3 Bio-fertilizers

Bio-fertilizers[18], when applied to the seeds, plant surfaces or soil, help plants to absorb nutrients, colonize the rhizosphere or interior of the plant, promote growth by enhancing the supply or availability of primary nutrients to the host plant and improve the yields by 10 to 25 % without adversely affecting the soil and environment.

As the soils of the project area are deficient in N,P,K, Zn etc. and keeping in mind the objective of reducing carbon emissions from rice fields, bio-fertilizers will be intensively used in the project. The selection of bio-fertilizers will differ from crop to crop and soil type. For example,

- Paddy farmers shall use Azolla\BGA, PSB culture and Zn Solubilizer.
- Pulse growing farmers shall use a combination of Rhizobium, PSB culture and Zn Solubilizer.
- Farmers for other crops will have to arrange N. fixing, PSB culture and Zn solubilize.

Farmers will have choice to use NPK consortium also in place of N. fixing bio-fertilizers.

Table 17: Year-wise bio-fertilizer requirement and cost

Sr. No.	Component	Unit	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	Total
1	Area	Lakh ha		1.75	2.00	2.40			6.15
2	Bio-fertilizer @1250/ha	Rs in lakh		2187.50	2500.00	3000.00			7687.50

The bio-fertilizer will be centrally procured by the project and distributed to the target farmers involving the FPOs and FPGs. For more details on the process please refer to the section Input Distribution System and Process on pg. 65.

1A.2.4 Conjunctive Water Use and Management (CWUM)

The 28 districts chosen by UP-AGREES exhibit various levels of challenges in water management. In general, private tube wells are the major source of irrigation

The gross and net irrigated area in these districts varies from 37 to 63% and 51 to 78% from district to district in Bundelkhand division; 37 to 85% and 32 to 85% in Vindhyachal region and 50 to 97% and 86 to 97% in the Eastern region respectively. Among Bundelkhand districts, Lalitpur has the lowest net and gross irrigated area. Banda has the highest irrigated area. In Vindhyan region, Sonbhadra has the lowest net (32%) and gross (37%) irrigated area. Out of 14 eastern districts under the project, Maharajganj has only 50 % gross irrigated area.

[18]Bio-fertilizer can be classified into three types:
- Bacterial Bio-fertilizers (such as *rhizobium, azospirillium, Azotobacter, Phosphate bacteria*,
- Fungal Bio-fertilizers such as *mycorrhiza*,
- Algal Bio-fertilizers like Blue green Algae, and Azolla and Actinomycetes.

In this context, to sustain adequate water supplies, groundwater management in the state is becoming a formidable challenge as well the foremost priority. Therefore, from the present emphasis on the creation and expansion of water resources, there is now a need to give more emphasis on improving the performance of the existing water resources facilities. There is an urgent need to increase efficiency of surface and ground water irrigation systems.

UP-AGREES will strengthen Conjunctive Water Use and Management (CWUM) towards Climate Resilience (CR) with the objective of optimal utilization and increased access to water resources, improved water use efficiency through increased micro irrigation coverage, reduced evaporation losses and increased evapo-transpiration and reduced GHG emissions from key value chains.

The project will promote **area-based approaches** for integrated water management for off-farm water management, on-farm water use efficiency and market linkages alongside accelerated adoption of **single-beneficiary-targeted models** for irrigation and micro irrigation services that can support in accelerating integrated agricultural water management in the region. Such approaches can bring in benefits of single-window approvals, large-scale procurement, and lower input costs. This would also help in accessing financial credit and marketing support.

Efforts will be made to ensure optimal water utilization and identify a scale-friendly model for community-level micro irrigation in Uttar Pradesh. As per land suitability, crop wise irrigation scheduling will be prepared. To enhance WUE, specifically in drought prone areas of Bundelkhand and Vindhayan region, emphasis will be on **promoting sprinkler and drip irrigation** among project farmers. Crops like pulses, oil seeds and maize will come under the **furrow irrigation** system. Technology developed by ICAR Institutes such as water sensors to measure soil moisture to control flooding irrigation, and automated sensors for timely irrigation, will be introduced to farmers of UP-AGREES.

This activity will be taken up by convergence with an existing GOI scheme (PDMC) and those who are not covered under it will be facilitated under the project as detailed below.

1A.2.5 Dovetailing centrally sponsored Per Drop More Crop with UP-AGREES

On 7th July 2023 State Government Vide, its G.O no 32/2023-1521/58-2023-429/2015-511.57 has issued detailed guidelines, regarding additional state assistance (Top-up) and implementation of Centrally Sponsored "**Per Drop More Crop (PDMC) (micro irrigation)**" scheme for the period starting from 2023-24 to 2026-27. Irrigation norms or spacing for sprinkler irrigation/drip irrigation vary from crop to crop, its cost varies accordingly.

In the centrally sponsored "**Per Drop More Crop**" (PDMC) scheme, 55% and 45% assistance is provided to small & marginal and other farmers, respectively with the

remaining 45 and 55 % share to be borne by the farmers in both the categories. In 2017-18, the State Government had issued an order to provide 35% additional assistance to the farmers for five years i.e., upto 2021-22 which it will extend to the farmers availing the PDMC scheme. In addition to traditional micro-irrigation systems (Drip and Sprinkler), the State Government has also added semi-permanent sprinklers, portable sprinklers, and large volume (rain-gun) sprinklers in the scheme.

Table 18: PDMC assistance pattern available in UP (2023-24 to 2026-27)

Sr No	Component	Farmers Category	Central Share	State Share	Top Up	Total State Share	Total Subsidy	Farmer Share
1	Drip, mini, micro sprinkler	S & MF	33%	22%	35%	57%	90%	10%
		Others	27%	18%	35%	53%	80%	20%
2	Portable, Semi-permanent, rain gun	S & MF	33%	22%	20%	42%	75%	25%
		Others	27%	18%	20%	38%	65%	35%

GST has been included in the subsidy given by GOI/GOUP in PDMC as per letter number –No. 2359 (1)-2023 dated 4.10.2023 by GOUP. This will drastically reduce the burden on famers as earlier it was borne by as farmers themselves.

The PDMC scheme excludes farmers who have more than 5 ha of land and also those who have less than 0.4 ha of area. In Bundelkhand region there are a number of farmers who possess more than 5.0 ha of land. Similarly, in eastern part of UP, there are scores of farmers who have less than an acre of land.. Therefore, in UP-AGREES project area there will two categories of farmer covered for micro-irrigation systems i.e. farmers eligible under the PDMC scheme and farmers who have either more than 5.0 ha land or less than 0.4 ha area.

Area to be dovetailed with PDMC-scheme,

In the 28 Project districts, it is proposed that a total area of 56,000 ha will be covered under the Per Drop More Crop (PDMC) scheme during the entire project period. Each year, 14000 ha area i.e. 500 ha in each district will be covered (targets may vary from district to district.) The year wise physical and financial targets are given below:

Table 19: Year-wise micro-irrigation area and cost to be dovetailed with PDMC scheme

Sr no	Component	Unit	2025-26	2026-27	2027-28	2028-29	2029-30	Total
1	Farmers between 0.4-5.0 ha (PDMC scheme)	ha	14000	14000	14000	14000	-	56000
2	Cost of Farmers between 0.4-5.0 ha(PDMC scheme)	Rs 0.75 lakh/ha	9000	9000	9000	9000		36000

The respective DPIUs will assess after a survey, the farmers those who are already being benefitted by PDMC scheme and a list of farmers those who are not covered under the scheme and are interested for micro irrigation systems. These farmers will be enlisted and facilitated to access the PDMC scheme from the Horticulture Department.

Area/Farmers to be financed through UP-AGREES

Those who are not covered under PDMC scheme will be encouraged to adopt micro-irrigation systems under the project area.. The DPIU level staff will conduct a survey of such farmers and clusters.

It is planned that a total of 11200 ha area will be covered during entire project period. This amounts to approximately, 2800 ha area each year i.e. 100 ha in each district (targets may vary from district to district). Year wise physical and financial targets are given below.

Table 20: Year-wise PDMC area and cost supported by UP-AGREES

Sr no	Component	Unit	2025 -26	2026 -27	2027 -28	2028 -29	2029 -30	Total (lakh Rs)
1	Other Farmers (UP-AGREES)	ha	2800	2800	2800	2800		11200
2	Cost of other farmers (UP-AGREES)	Rs 0.75 lakh/ha	2100	2100	2100	2100		8400

Institutional Arrangements

A co-ordination with already established Uttar Pradesh Micro Irrigation Project (UPMIP) will be done for facilitating delivery of micro irrigation and water use efficiency programs under the UP-AGREES initiative.. GPs and Blocks in Bundelkhand and Vindhyachal regions where water deficiency is a major cause for concern will be prioritized for adoption of micro irrigation at scale.

In the command area regions of Eastern Uttar Pradesh, the UP-AGREES project will adopt an area-based approach to cover community-level irrigation infrastructure and target rice-wheat cropping systems for maximizing productivity and water use efficiency. In addition to facilitating the penetration of micro irrigation technologies in co-ordination with the UPMIP and Community Micro irrigation programs, the UP-AGREES program will also work with the FPOs.

2030 Water Resources Group, a World Bank-supported Trust Fund, is already assisting and working with departments/agencies involved in providing efficient irrigation systems to farmers. UP-AGREES and the Technical Assistance facility offered by 2030 WRG will coordinate efforts under the Agriculture Production Commissioner's (APC) office to ensure prioritization of micro irrigation adoption in the State and specifically under the project area.

1A.3 Farming Practices-Technology Sub-System

UP-AGREES' farming practices-technology interface will adopt a cutting-edge approach to harmonise traditional practices with modern technology for promoting precision farming sub-system for resource-use efficiency, resilience, and sustainability. The project will establish FMBs for custom hiring centres in convergence wherever relevant) for equipment deployment and utilisation, optimizing machinery utilisation through demand forecasting

and predictive maintenance. FMBs will provide back-up support to integrate agronomic practices with appropriate precision technology by bringing innovation, efficiency and sustainability in resource use. This integrated approach will not only enhance agriculture productivity but also promote environmental stewardship towards resource conservation.

UP-AGREES will incorporate integrated pest management (IPM) approaches in the project areas as an effective and environmentally sensitive approach to pest management that relies on a combination of common-sense practices.

Table 21: Farming practices technology sub-system

System	Critical Features
1. Farming System	Crop-specific, and Cropping-system Farming Practices, Integration with Allied Sectors
	Traditional practices on soil fertility management, crop-calendar, sowing-harvesting practices, residue management
2. Traditional Equipment /Practices	Cultivation Techniques, Conservation Farming, Tillage and Harvesting Practices, Tools and Techniques
	Storage Practices, Grain Transport Facilities, Water Pumping, Surface Supply
3. Precision-Farming System	Regional and Local Climate Variables, Impact Factors on Crop Productivity,

Each of the sub-systems assessment/analysis and its inter-action(s) will lead to capturing the gaps in designing a protocol of practices to address the productivity constraints. For instance, to increase water-use efficiency the need for adopting raised-bed plantation and consequent requirement for a raised-bed planter would be included in the package of practices. UP-AGREES will optimise the use of solar energy in water pumping and storage systems. A systems approach is crucial for breaking a system into sub-systems for a comprehensive need assessment at all levels in the crop productivity chain.

1A.3.1 Farm Machineries

In Uttar Pradesh there continues to be a mismatch in the non-tractor market between the mechanization requirement of small/marginal farmers and supply in the market. Increased levels of adoption of mechanization can increase farm incomes by way of reducing input costs, maximizing efficiencies in labour, seed, fertilizers, and chemicals, improving land quality, increasing cropping intensities, and avoiding harvest and processing losses respectively. Adoption of farm machinery has the potential to increase productivity up to 30 per cent and reduce the cost of cultivation up to 20 per cent[19]. Farm mechanization also helps with reducing GHG emissions in agriculture through better soil management, reduced losses and ability to adopt carbon smart cultivation approaches.

There is a need to make machinery more accessible for small and marginal farmers in UP by streamlining processes for management of schemes and programs that support increasing farm mechanization levels, strengthening institutional structures to support

[19] NABARD 2018. Sectoral paper on Farm mechanization. Farm Sector Policy Department.

mechanization at a village and block level and enhancing local skill and capacity levels for supporting mechanization value chains

In UP-AGREES, farm mechanization will be taken up with the following objectives;

(i) To increase the reach of mechanization to small and marginal farmers and to areas where availability of farm power is low.
(ii) Promotion of Farm Machinery Banks (FMBs) to members of FPGs on custom hiring basis to offset the adverse economies of scale arising due to small land holdings and high cost of individual ownership.
(iii) Capacity building through training and demonstrations. Major thrust in this component shall be to ensure proper levelling, line sowing, sowing of crops like pulses and oilseeds on ridge and furrow systems of cultivation, popularization of conservation tillage, crop residue management and adoption of better irrigation practices.

The UP-AGREES program will support in:

- The **demand-supply estimations** at a village level for required farm equipment, digitization of inventories at FMBs, development of a credit facility for FPOs to support increased mechanization within their FPGs.
- The **establishment of 123 FMBs one in each block** for the program to ensure the supply of relevant farm equipment that is required for sustainable agriculture the project will adopt appropriate financing model to maximise the numbers of establishment and usage of FMBs in project area by using incentives from project fund as well as convergence from state government schemes.
- **Institutional strengthening** at a district level and **capacity building** for the development of a robust farm equipment operation and maintenance network in order to ensure higher adoption of farm mechanization at a small holder farmer level.

There are two existing Government of India schemes for supporting creation of FMB which provides 80% subsidy for procuring machinery and equipment:

a. Sub-Mission on Agriculture Mechanization (SMAM)
b. Crop Residue Management (CRM)

In each block, The FMBs will be created with the existing/newly formed FPOs to benefit the FPG member farmers on priority for hiring and utilizing the various machinery and equipment.

UP Accelerator PRAGATI x UP-AGREES

The UP Accelerator PRAGATI is a technical assistance program of the World Bank Group to support sustainable agriculture in Uttar Pradesh. The Accelerator is working closely with the Govt of UP and the private sector to address specific challenges related to availability, accessibility and affordability of farm mechanization for small and marginal farmers in UP. UP AGREES will align and build on these efforts of the UP Accelerator PRAGATI.

1A.3.2 Plant Protection

UP-AGREES will incorporate integrated pest management (IPM) approaches in the project areas as an effective and environmentally sensitive approach to pest management that relies on a combination of common-sense practices.

In UP-AGREES, it is proposed to develop Integrated Pest Management (IPM) modules for each crop being taken up in the area. With the help of national and international institutes, crop advisories, radio messages, messages shall be prepared and disseminated through Apps developed by technical partners and research institutions.

Mechanical methods such as crop barriers, screens, traps, mulching, weeding etc. are proven methods of IPM technology. Once cultural or mechanical measure fail to check the spread of pest, biological measures such as releasing beneficial insects in the field to prey on pests, using pheromones to lure pests in to traps can be used. There are many biological product options such neem oil, neem cake, bio-agents like Trichoderma, Baveria, etc. that are extremely effective against several pests. The following IPM package is suggested in the field:

Table 22: Year-wise IPM package and cost

Sr No	Component	Unit	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	Total
1	Area	lakh ha	Preparation phase	1.75	2.00	2.40		follow up phase	6.15
2	Bio agent/Pesticides (2).5Kg/ha	lakh Kg	Preparation phase	8.75	10.00	12.00		follow up phase	30.75
3	Pheromone Traps 5/ha	lakh No.	Preparation phase	8.75	10.00	12.00		follow up phase	30.75
4	Neem oil 1Kg/ha	lakh Kg	Preparation phase	1.75	2.00	2.40		follow up phase	6.15
5	Light traps 2/ha	lakh No.	Preparation phase	3.50	4.00	4.80		follow up phase	12.30
6	Cost of Bio-agent	Rs in lakh	Preparation phase	875	1000	1200		follow up phase	3075
7	Cost of Pheromone Traps	Rs in lakh	Preparation phase	875	1000	1200		follow up phase	3075
8	Cost of Neem oil	Rs in lakh	Preparation phase	525	600	720		follow up phase	1845
9	Cost of light traps	Rs in lakh	Preparation phase	3500	4000	4800		follow up phase	12300
10	Total Cost	Rs in lakh	Preparation phase	5775	6600	7920		follow up phase	20295

The plant protection chemicals/ bio-pesticides/ bio-control agents etc. will be centrally procured by the project and distributed to the target farmers involving the FPOs and FPGs. For more details on the process please refer to the section Input Distribution System and Process on pg. 65.

Input Distribution System and process

The respective DPIUs will plan their yearly activities and accordingly the assessment of inputs requirement for FPGs/project village will be prepared. All the inputs assessed will be centrally procured through a competitive bidding process and the supply will be taken for destination to district wise stores. These stores will be hired by the DPIU as per need. A detailed input distribution inventory will be prepared and shared with each and every FPG for their knowledge and transparency.

The respective DPIUs will further provide the inputs from the stores to project villages for distributing them among the FPGs. Each FPG will further distribute to their individual member farmers as per their share. This entire process will be closely monitored by the project staff preparing with a clear-cut inventory of distribution and balances (if any).

This methodology will be applicable for most of the inputs to be distributed e.g. Dhaincha seeds for green manuring, gypsum, micro-nutrients, seeds, integrated pest management (IPM), bio-decomposer, bio-fertilizer etc.

Implementation Arrangement

The project activities will be confined to 6.15 lakh ha in 3690 villages in 123 Blocks of 28 Districts hailing from 8 divisions and benefitting a total of 8,32,500 farmers.

In the implementation of this component, the services of a technical Support Organization will be taken. It is envisioned to have a Support Organization in each of the project districts. These support agencies will be hired using a competitive bidding process.

Block and Village Selection

As already mentioned, UP-AGREES project is proposed in 28 districts of Jhansi, Chitrakoot, Varanasi, Vindhyachal, Gorakhpur, Azamgarh, Basti and Devipatan divisions of the state. There are 319 development blocks in these 28 districts with net cultivated area of 61.57 lakh ha with 93.15 lakh farmers. Of the total 93.15 lakh farmers, 73.70 lakh (79.12%) are marginal, 10.99 lakh (11.80%) are small, and 8.46 lakh (9.08%) fall in large farmer category.

Block Selection

Aligning with the project objective to promote climate resilient, inclusive, and competitive value chains of prioritized agriculture commodities in UP, UP-AGREES has developed a set of inclusion and exclusion criteria for identifying project implementation sites in 28 districts in the state. The basic purpose of developing section criteria is to freeze the sites/blocks so that the project implementation can proceed without any external interruption towards achieving project goals.

***Inclusion criteria*:** As the core objective of the project is to address constraints in realizing productive potential of selected crops under climatic duress, blocks, villages/clusters to be included from among 28 project districts would need to fulfil a combination of characteristics (with an aim creating crop hubs to group individual farmers for achieving volume while sustaining productivity with emission rider). These include:

- Large contiguous area with similar soil characteristics, similar crop cycle and lower productivity.
- Presence of good road network.
- Presence of good extension services.
- Access to market and financial services for input supply and output marketing.

***Exclusion criteria*:** Exclusion criteria secludes areas that neither support nor help in delivering the project goals. These include;

- Areas under Reserve forests, National Park, Bio sphere Reserves etc.
- Critically degraded areas needing substantive investment is rehabilitation.
- Declared disturbed areas.

It is proposed to take up project activities intensively in about 5000 ha net cultivated area in each block so that a perceptible change in productivity and income levels of the farmers could be visible. It is further proposed that project activities be implemented in at least 4 Development blocks in Districts with up to 12 blocks and 5 development blocks in districts with more than 12 blocks.

Based on above criteria, number of blocks, approximate project area and number of farmers per district and farmer producer groups (FPGs) are given in the following table.

Table 23: UP-AGREES blocks, project area, farmers and farmer collectives (nos)

Division	District	Total Blocks (No.)	Selected Blocks (No.)	Net cultivated (ha)	Selected area (ha)	No, of Farmers (No.)	FPOs No.	FPGs No.
Bundelkhand Zone								
Jhansi	Jhansi	8	4	316806	20000	20000	4	1000
	Lalitpur	6	4	290669	20000	20000	4	1000
	Jalaun	9	4	342768	20000	20000	4	1000
	Total	**23**	**12**	**950243**	**60000**	**60000**	**12**	**3000**
Chitrakoot	Chitrakoot	5	4	165019	20000	20000	4	1000
	Banda	8	4	339729	20000	20000	4	1000
	Mahoba	4	4	233147	20000	20000	4	1000
	Hamirpur	7	4	289212	20000	20000	4	1000
	Total	**24**	**16**	**1027107**	**80000**	**80000**	**16**	**4000**
Eastern UP Zone								
Vindhyanchal	Mirzapur	12	4	212130	20000	20000	4	1000
	Sonbhadra	10	4	184732	20000	20000	4	1000
	Bhadoi	6	4	64223	20000	30000	4	1000
	Total	**28**	**12**	**461085**	**60000**	**70000**	**12**	**3000**
Varanasi	Varanasi	8	4	101670	20000	30000	4	1000
	Chandauli	9	4	135417	20000	30000	4	1000

	Jaunpur	21	5	274778	25000	37500	5	1250
	Ghazipur	16	5	260491	25000	37500	5	1250
	Total	**54**	**18**	**772356**	**90000**	**135000**	**18**	**4500**
Gorakhpur	Gorakhpur	19	5	238244	25000	37500	5	1250
	Maharajganj	12	4	190183	20000	30000	4	1000
	Deoria	16	5	188646	25000	37500	5	1250
	Kushinagar	14	5	212727	25000	37500	5	1250
	Total	**61**	**19**	**829800**	**95000**	**142500**	**19**	**4750**
Azamgarh	Azamgarh	22	5	286990	25000	37500	5	1250
	Mau	9	4	119795	20000	30000	4	1000
	Ballia	17	5	216842	25000	37500	5	1250
	Total	**48**	**14**	**623627**	**70000**	**105000**	**14**	**3500**
Basti	Basti	14	5	196080	25000	37500	5	1250
	SantKabirnagar	9	4	121056	20000	30000	4	1000
	Siddharthnagar	14	5	223367	25000	37500	5	1250
	Total	**37**	**14**	**540503**	**70000**	**105000**	**14**	**3500**
Devipatan	Gonda	16	5	281460	25000	37500	5	1250
	Balrampur	9	4	216240	20000	30000	4	1000
	Baharaich	14	5	333396	25000	37500	5	1250
	Shrawasti	5	4	121953	20000	30000	4	1000
	Total	**44**	**18**	**953049**	**90000**	**135000**	**18**	**4500**
Grand Total		**319**	**123**	**6157770**	**615000**	**832500**	**123**	**30750**

Crop Selection Criteria

(i) As a first step, it is decided to select 2-3 major crops in each season. For this, the crop selection criteria will focus on large area coverage and minimum productivity blocks.

(ii) Since the main aim of the project is to enhance productivity of the identified major crops in the project areas, the blocks with the lowest productivity of major crops will be selected under the project.

(iii) In addition to enhancing the productivity of the identified major crops, the project aims to diversify about 08 to 12 percent area to more remunerative crops/cash crops.

(iv) Other parameters such as road network, extension services, access to market and credit facility will also be considered while selecting crops for each block.

Based on the data of 2022-23 the Statistical Division, Department of Agriculture, crops have been selected for all the 28 districts. 2 -3 major crops each in Kharif & Rabi season occupying the maximum area will be chosen for project intervention as depicted below. Block wise productivity and crop coverage has also been assessed for each crop based on crop cutting data of the year 2022-23.

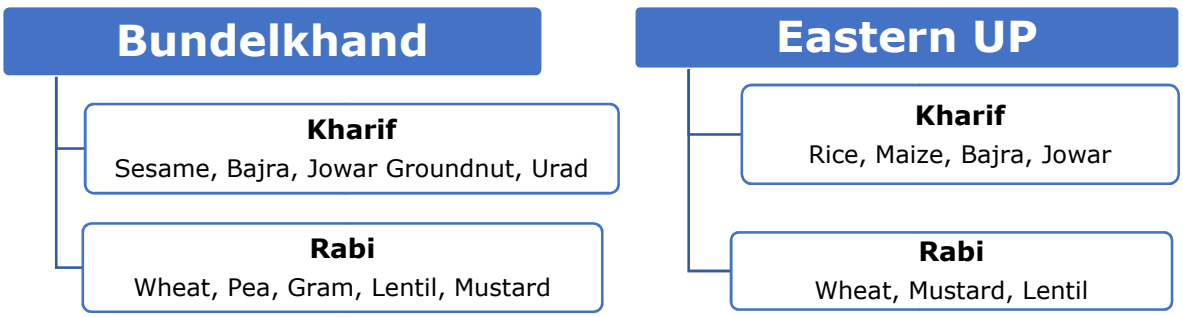


Figure 17: Target Rabi and Kharif crops

Formation of Farmer Producer Groups (FPGs)

Once the target small holder farmers for the project have been identified, the process to sensitize and mobilize them into farmer producer groups (FPGs) will be carried out.

The number of farmers in a group will be 30-35 with a total cultivated area of 18-22 hectares. Efforts will be made to mobilize farmers whose land is largely contiguous and those who are adopting similar cropping pattern. This will be vital from the point of view of collectivization, production and marketing.

Mobilization activities will involve intensive awareness campaigns through electronic media, mass media, pamphlets, posters, individual contact, small group meetings, mass meetings where farmers will be informed about the proposed project and its activities.

Focus group discussions will be carried out with farmers to:

- Identify the key issues/problems they face regarding production and marketing of their produce.
- Share with them the benefits of working in a group.
- Bring about consensus amongst them to organize themselves, initially, into village level smaller groups, keeping in mind the proximity of their land and the crops grown by them.

Once the farmers understand and agree to form groups, they will be informally recognized as a **Farmer Producer Group (FPG)**. **The timeline** required from mobilization to FPG formation will be around 3 to 6 months. The FPGs will gradually be linked to existing farmer producer organizations (FPOs). Where FPOs are not existing, new FPOs will be formed.

Activities of the FPGs

After the FPGs are formed, the following activities will be carried out:

- Group leaders will be selected
- Farmer trainings will be organized
- Meeting schedules as per crop and crop seasons will be prepared
- Crop plans will be prepared by the FPG with the assistance of the Technical Assistant (TA) and Senior Technical Assistant (STA) of a Support Organization (SA) hired by the project.
- Inputs will be distributed/ arranged by the FPG with the assistance of the Support Organization and project assistance will be passed on to the group members as per government/project norms.
- Project functionaries (Support Organization and UP-AGREES staff) will support and supervise field level activities of the FPGs and assist them in adoption of better agronomic practices, irrigation management, plant protection measures and collectivization of the produce.

- The Support Organization will also work with the FPGs to ensure that increased production through the project is linked to the market for better realization of prices.

Crop Specific FPGs

Already mentioned, project activities will be confined to 6.15 lakh ha in 123 Blocks of 28 Districts. It is proposed to form **crop specific Farmer Producer Groups (FPGs) of around 20 ha**. Thus in 28 districts, **around 30,750 Farmer Producer Groups** will be formed.

These Groups will be crops specific. All the Farmers of FPG will have same cropping pattern in Kharif and Rabi both. Once Crop Specific **30,750 FPGs** are formed and properly groomed in group functioning, large crop specific cluster will be formed. Basis of the crop clusters will be total area under that crop**.** For horticulture crops, pulses and oil seeds, size of the cluster will be between 300-600 hectares and Crop Clusters of field crops, mainly of Wheat and Paddy will have an area of 3000 to 5000 hectares. Therefore, in the project districts it is proposed to form around 800-1000 clusters. Benefits of FPGs and Cluster will be reflected while preparing crop plan, input estimation, capacity building, implementation of the activities, Business Plan, monitoring and review.

Collectivization of the produce of groups /cluster will provide maximum benefit in marketing of the produce, value addition, branding and packaging. Groups will be able to negotiate market price in much better way due to large quantity. Groups/Clusters can also arrange quality inputs i.e. Seeds, fertilizer and chemicals at much better price.

Table 24: Summary of UP-AGREES Component 1 coverage

1.	**Total Cultivated Area in 28 Districts**	**64.86 lakh ha.**
2.	Area taken up for implementation	6.15 lakh ha
3.	No of Developmental Blocks in 28 Districts	123
4.	No. of Villages in 123 Blocks (30 villages/block)	**3690**
5.	No of Farmer Producer Organization (FPOs)	**123**
6.	No of Farmer Producer Groups (FPGs) each over an area of 20 ha	**30,750**
7.	No of Crop Clusters	1000-1200

Farmer Producer Organizations (FPOs)

In the project area, a survey will be conducted to assess the current status of FPOs and accordingly where no existence of FPO is found, the formation of new FPOs will be planned and executed. The project will strengthen the existing FPOs as per need through appropriate capacity building. It will be ensured that at least one active FPO is available in each project block to link with FPGs to perform and support various project activities. A detailed business plan will be prepared by the respective FPOs in consultation with their linked FPGs. Wherever needed, the project will facilitate the FPOs for their capacity building, strengthening forward and back linkages and access to finance.

Identification of low productivity Gram Panchayats

Once the low productivity blocks are finalized, 30 Gram Panchayats will be selected in each block based on similar crop coverage in Kharif and Rabi. 5 village circles will be formed from these 30 Gram Panchayats with each village circle consisting of 5-6 Gram Panchayats. 28 districts will have around 3690 Gram Panchayats under UP-AGREES and 615 village circles will be established as working unit under Component 1.

Block Level Arrangements

Component 1 will cover 5000 ha in one block of the project area. A suitable support organisation will be engaged to provide grassroot support to target area and farmers within the project.

Women Farmer Producer Groups (WFPGs)

UP-AGREES will target the participation of women across all project interventions. At least 30 percent of farmers supported by the project will be women. In addition, the project will make concerted efforts to include marginalized communities, such as farmers belonging to Scheduled Castes and Scheduled Tribes.

Objectives & Strategy

Under the social inclusion policy

- To enhance the productive participation of women/SC/ST/Landless in Agriculture
- To create sustainable agricultural livelihood opportunities
- To improve the skills and capabilities of women in agriculture, fisheries and horticulture to support farm and non-farm-based activities.
- To improve the capacities of women in agriculture & allied areas to access the resources of other institutions and Special Provisions (only for women)

Potential Activities for WFPGs in UP-AGREES

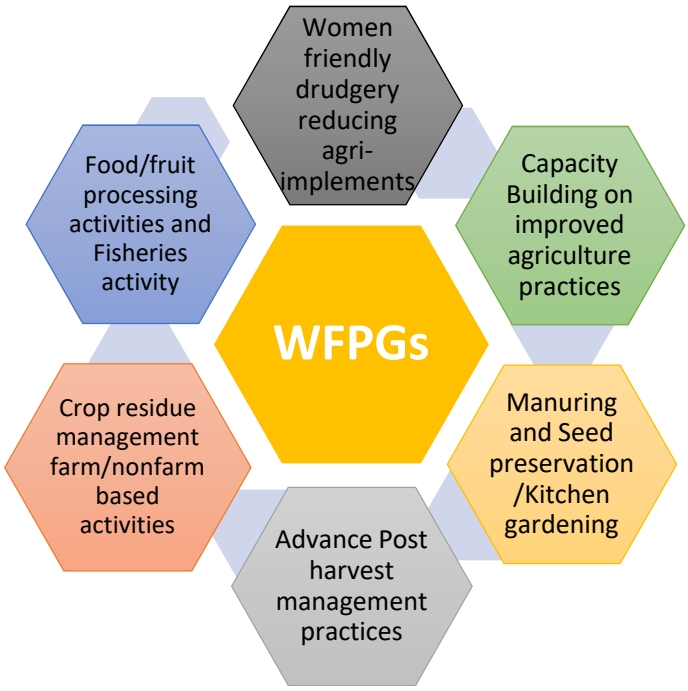


Figure 18: UP-AGREES WFPGs Activities

1. Farming Activities
2. Manuring and Seeds preservation
3. Potential Areas in Post Harvest Management
4. Potential Areas in Crop Residue Management
5. Horticulture & processing Activities
6. Fisheries & processing Activities
7. Improved women friendly agriculture implements

Proposed Implementation strategy

The Project: "UPAGREES" is being implemented by PMU-UPDASP in partnership with Technical Institutions/Universities, NGOs/Support Agencies across 28 districts in U.P. These agencies are expected to support and nurture scalable climate resilient agriculture and allied sector livelihood models, increase income of the farmers and job creation in project intervention areas.

For formation and strengthening of WPGS in the project area, following activities/strategy will be adopted:

- Baseline survey of the project area to identify/map the beneficiaries and potential activities
- Collection of baseline data and analysis of status/data regarding HHs/prospect beneficiaries
- Preparation of village wise Micro-plans formats and capacity building of field staff on this
- Preparation of Micro Plans for WFPGs through participatory method
- Preparation of annual action plan based on micro plan
- Capacity building of WFPGs on group functioning, management and financial literacy
- Linkage of WFPGs with banks and financial institutions
- Skill development training of WFPGs in identified micro-medium agri-allied businesses
- Capacity building for marketing and linkage with digital marketing platforms
- Implementation of Micro action plan

Proposed Beneficiaries:

- Approx. 9225 Women/Landless FPGs @2-3 WFPGs per village (covering 8 divisions, 28 districts, 123 blocks & 3690 villages)
- Each WFPG will consist of 10-20 members.
- Approx. 1,40,000 women and landless farmers will be benefitted at the end of the project.

Table 25: Details of Women FPGs to be formed/mobilized

Division	District	Total Blocks (No.)	Selected Blocks (No.)	Net cultivated area (ha)	Selected area (ha)	Number of WFPGs	No. of Women Farmers (No.)
Bundelkhand Region							
Jhansi	Jhansi	8	4	316806	20000	300	4500
	Lalitpur	6	4	290669	20000	300	4500
	Jalaun	9	4	342768	20000	300	4500
	Total	**23**	**12**	**950243**	**60000**	**900**	**13500**
Chitrakoot	Chitrakoot	**5**	4	165019	20000	300	4500
	Banda	**8**	4	339729	20000	300	4500
	Mahoba	**4**	4	233147	20000	300	4500
	Hamirpur	**7**	4	289212	20000	300	4500
	Total	**24**	**16**	**1027107**	**80000**	**1200**	**18000**
Eastern UP Zone							
Vindhyanchal	Mirzapur	**12**	4	212130	20000	300	4500
	Sonbhadra	**10**	4	184732	20000	300	4500
	Bhadoi	**6**	4	64223	20000	300	4500
	Total	**28**	**12**	**461085**	**60000**	**900**	**13500**
Varanasi	Varanasi	**8**	4	101670	20000	300	4500
	Chandauli	**9**	4	135417	20000	300	4500
	Jaunpur	**21**	5	274778	25000	375	5625
	Ghazipur	**16**	5	260491	25000	375	5625
	Total	**54**	**18**	**772356**	**90000**	**1350**	**20250**
Gorakhpur	Gorakhpur	**19**	5	238244	25000	375	5625
	Maharajganj	**12**	4	190183	20000	300	4500
	Deoria	**16**	5	188646	25000	375	5625
	Kushinagar	**14**	5	212727	25000	375	5625
	Total	**61**	**19**	**829800**	**95000**	**1425**	**21375**
Azamgarh	Azamgarh	**22**	5	286990	25000	375	5625
	Mau	**9**	4	119795	20000	300	4500
	Ballia	**17**	5	216842	25000	375	5625
	Total	**48**	**14**	**623627**	**70000**	**1025**	**15375**
Basti	Basti	**14**	5	196080	25000	375	5625
	SantKabirnagar	**9**	4	121056	20000	300	4500
	Siddharthnagar	**14**	5	223367	25000	375	5625
	Total	**37**	**14**	**540503**	**70000**	**1025**	**15375**
Devipatan	Gonda	**16**	5	281460	25000	375	5625
	Balrampur	**9**	4	216240	20000	300	4500
	Baharaich	**14**	5	333396	25000	375	5625
	Shrawasti	**5**	4	121953	20000	300	4500
	Total	**44**	**18**	**953049**	**90000**	**1350**	**20250**
Grand Total		**319**	**123**	**6157770**	**615000**	**9225**	**138375**

An appropriate technically competent professional agency will be engaged to support this activity.

Implementation Plan of Activities of WFPGs

Table 26: Implementation plan for WFPGs

Sr.	Activities	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6
1	Baseline survey of the project area to identify/map the beneficiaries and potential activities						
2	Collection of baseline data and analysis of						

Sr.	Activities	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6
	status/data regarding HHs/prospect beneficiaries						
3	Preparation of village wise Micro-plans formats and capacity building of field staff on this						
4	Preparation of Micro Plans for WFPGs through participatory method						
5	Preparation of annual action plan based on micro plan						
	Formation/adoption of WFPGs						
6	Capacity building of WFPGs on group functioning, management and financial literacy						
7	Linkage of WFPGs with banks and financial institutions						
8	Skill development training of WFPGs in identified micro-medium agri-allied businesses						
9	Capacity building for marketing and linkage with digital marketing platforms						
10	Implementation of Micro action plan						
11	Monitoring and evaluation on related PDO						

Expected Outcomes

- At the end of the project, 9225 exclusive women FPGs will be supported by the project
- At the end of the project, at least 25 percent women led MSMEs access credit from formal financial institutions
- Women's representation in executive committees of Farmer Producer Groups
- Women farmers reached with agricultural assets or services

Sub-Component 1B: Seed Systems

This sub-component will promote, develop, and establish a self-sustaining inclusive and climate-resilient seed system to enhance quality crop yields in the project areas. It strives to strengthen institutions and governance in the seed supply chain by building farmer centric seed hubs. The project will support individual farmers and collectives engaged in the production and processing of climate-resilient and quality seeds. Specifically, the project will finance activities for:

(i) Improving seed / varietal replacement rate in low-productivity zones. It is estimated that the direct contribution of seed quality alone to the total production is about 15-20 percent, which can be raised to 45 percent with the efficient management of other inputs.

(ii) Improving seed production ecosystem through identified farmers or their collectives to take seed production as an enterprise for improving timely supply of seeds. With support from UP Beej Vikash Nigam (UPBVN), the project will collaborate with leading research institutions in the state (viz., Consortium of International Agricultural Research Centres or

CGIAR and National Agricultural Research System or NARS), and the private sector to design and implement a participatory lab-to-land mechanism to ensure timely supply of breeder seeds and technologies for replication. Digitalization of seed systems will be adopted to help the district administrations estimate the demand-supply gap for crops and facilitate in increasing seed / varietal replacement ratios. The project will target to promote adoption of late sowing, early maturing /short duration varieties.

(iii) Improving seed dissemination in partnership with public and private channels, including promotion of direct seed marketing to farmers through certified individuals Farmer collectives / Farmer Producer organisations[20].

The project will strengthen the State Seeds Corporation in partnership with the private sector by establishing high-tech seed nurseries production technologies, digitalization of seed systems, prioritization of stress-tolerant varieties, and entrepreneurship promotion in the seed sector. The project activities will seek to close the demand-supply gap in the seed sector and influence the seed replacement rate of key crops, significantly by increasing the availability and access for small scale producers.

UP Beej Vikash Nigam (UPBVN) will be a key implementing partner for this sub-component and will be brought on board the project through a service contract.

1B.1 Seed Production and Distribution Systems

Seed is the basic and the most critical input for sustainable agriculture. The response of all other inputs depends upon the quality of seeds to large extent. It is estimated that the direct contribution of quality seed alone to the total production is about 15- 20% depending upon the crops and it can be further raised up to 45% with the efficient management of other inputs and package of practices.

Seed production systems in the country/states provide adequate safeguards for quality assurance in the seed multiplication chain to maintain the purity of varieties as it flows from breeder to the farmer. The system recognizes three generations, namely breeder, foundation, and certified seeds. Breeder seed production systems is the mandate of ICAR whereby it is taken up by ICAR Institutions, National Research Centres, SAUs, Sponsored breeders, recognized state seed corporations, NSC and KVKs. Foundation and Certified Seed production is the responsibility of State Agriculture Departments, State Seed Corporations, NSC, and private seed producers.

The distribution of seeds is ensured through a number of channels i.e., Departmental Outlets, State Seed Corporations, Cooperatives, UPAGRO, Private Seed Traders etc. Season wise and Crop wise seed requirement and availability of certified seed is ascertained by the

[20] Seed channels typically associated with the formal seed system (NARS, State Seed Corporation etc.) pose significant challenges including high overhead costs and inefficiencies such as insufficient or late delivery of seeds, and inferior seed quality. Private seed channels are often expensive for smallholder farmers and limited to few crops and varieties.

State department of agriculture. GOI also periodically keeps assessing the requirement and availability of certified, foundation and breeder seeds and assists in bridging the gap through its own resources or from Seed producing agencies of other states.

Uttar Pradesh Seed Certification Agencies is the certification agency for the entire seed production chain of foundation and certified seeds in the state. As per the data of 2021- 22 of Seed Certification Agency of UP, 29.54 lakh quintals certified and foundation Seed was produced in the state by Government, Semi-government Agencies and Private Seed Producers. Out of the total area of 1.46 lakh ha registered under certified and foundation programmes, 0.55 lakh ha area is under Government and Semi-government Agencies and remaining 0.81 lakh ha is under seed programmes implemented by private seed producers. Out of 29.54 lakh qntls seed Produced only 7.7 lakh qntls is produced by government agencies and remaining by private seed companies.

1B.2 Diagnostic Study

Data clearly indicates that there is a big gap between the seeds distributed and seed produced in the state. There could be two reasons behind such a huge gap. Either large quantity of truthful seed produced in the state is in the distribution chain or Seed is coming from out of the state. In both the situation, there are immense possibilities of bridging this gap by producing certified seed within the state. UP-AGREES provides ample opportunity to strengthen the State Seed Production System and its distribution to the farmers.

The project will conduct a Diagnostic Study for assessment of

- seed demand and supply gap in the project area
- prevailing system of seed supply and distribution
- status of seed replacement
- use and availability of quality seeds
- seed production in the project area
- possibility of creating seed hubs with quality seed production

This study will be funded by the project and be carried out by a consulting agency based on a competitive bidding process. This report will be used a basis for the creation of Seed Hubs and production of quality seeds in-situ as part of the project.

1B.3 Establishment of Seed Hubs

The project will identify and support farmer collectives (FPG / FPO) to take up seed production as an economic activity to address poor Seed/Varietal Replacement Rate for improving timely supply of quality seeds. The project, with the support of UP Beej Vikash Nigam (UPBVN), will design and implement a lab-to-land mechanism in collaboration with leading research institutions in the state (viz., IRRI and National Institutions), to ensure timely supply of breeder seeds and technologies for seed production at the field level. Under this sub-component, support will be extended to key players to overcome

bottlenecks to improve the performance of the seed supply chain in the project area while addressing constraints with the volume, quality, availability and access to seed varieties with climate-resilient features viz., short duration, stress tolerant etc.

To address the productivity constraints in project area while supporting Climate Smart Agriculture, special emphases will be laid on in-situ quality seed production through promotion of 28 Seed Platform/Seed Hubs in 28 UP-AGREES districts.

Initially 2-3 FPGs, in agreement with Farmer members of the groups, will be converted into Seed Producing FPGs. These groups will be trained in **Customized Seed Production of specific crops**. They will be provided breeder/foundation Seeds and Foundation/Certified Seed Production will be carried out. UPBVN will assist in production of Foundation/Certified seed. The produced Certified Seed will be used for distribution among beneficiary farmers as per the crop plan. Foundation seed produced by the Farmers Groups will be bought back by the UPBVN for certified Seed Production Programme as per requirement. Fee for the certification process will be borne by the project in first year. Farmers/FPGs getting breeder / foundation seed for seed production will avail the normal subsidy (as per the government norms) from the project.

As 28 Seeds Hubs are initially proposed - one in each district, they will require assistance for creation of seed processing infrastructure, procurement of raw seed from member farmers, seed storage godown and other logistic support for which a tentative provision of Rs 25.00 lakh / Seed Hub has been kept.

Table 27: Year-wise establishment of seed hubs

#	Name of Expense	Unit	Seed Hubs (No)	Yr1	Yr2	Yr3	Yr4	Yr5	Yr6	Total (Rs in Lakh)
1.	Establishment of Seeds Hubs	25.00 Lakh/ Seed Hub	28	– –	200.00	250.00	250.00	–	–	700.00

UP-AGREES will solicit business plans from FPOs for the creation of seeds hubs. The business plans will be required to have details and costing of:

- creation of seed processing unit (rented or owned),
- procurement of foundation seeds from member farmers,
- processing activities and costs
- rental of godowns for 6-8 months for scientific storage.

The business plan proposed budget should be at least Rs. 50 lakhs keeping in mind the various cost items. UP-AGREES will provide Rs. 25 lakhs as grant to the FPOs. The District Project Implementation Unit (DPIU) in consultation with UPBVN will assist the FPOs to develop a detailed business plan and also facilitate the FPOs in getting bank loans. The FPOs will sign an MoU with the project and grant from the project will be given only after the sanctioning of bank loan.

1.B.4 Seed Distribution

In project areas of 28 districts with 6.15 lakh ha area under component-1, crop wise certified seed requirement has been assessed for kharif and rabi crop. Seed Production programme through FPO/ Farmer Producer Groups (FPGs) is proposed in UP-AGREES**.** Major objective of the programme will be to ensure availability of quality certified seeds of locally suitable high yielding, short duration and climate resilient varieties, not only for the project area but also for the farmers of outside of the Project area. Existing seed indent system of the project area has also been reviewed and it has been found that seeds of older varieties in most crops are being distributed. Therefore, the latest varieties suitable for the prevalent agro-echo situations have been identified in consultation with Research Institutions, DoA UP and UPBVN for the project area and will be taken up under Seed Production Programme at project level. Updating of the varieties will be a regular phenomenon. The list of identified improved varieties is given in Annexure 2.

Based on the crop wise seed requirement of the project area **a five-year Seed Rolling Plan** will be prepared and a requisition for allocation of breeder seed will be sent to Ministry of Agriculture GOI through state government channel, a regular seasonal process. Once the allocation of Breeder/Foundation Seed is done, the production of area specific, short duration, climate resilient, low G.I (rice), stress tolerant high yielding varieties will be ensured, involving Farmer Produces Groups (FPG) and assistance of Technical Institutions. This activity will be a regular feature for the entire project period and efforts will be made to develop a Seed Production System in 28 districts that continues to function even after project is over and not only caters to the seed requirement of project area but also caters to the requirement of farmers outside the project area.

As already mentioned, 6.15 lakh ha area is proposed to be covered during project period in both Kharif and Rabi season. Based on the existing crops being taken up in the region, a crop plan both for Kharif and Rabi has been prepared and accordingly, the seed requirement has been assessed and an estimated seed rolling plan is prepared. To produce around 7.24 lakh quintals of Certified/ Notified Seed of area specific high yielding varieties of various Kharif and Rabi crops, project will require around 1450 qntls of Breeder Seeds Crop wise requirement for Kharif and Rabi in given table below;

Further, the seed requirement for certified category has also been made for subsequent years assuming certified seeds may be used for three years without any significant yield reductions.

Table 28: Seed Requirement of Kharif and Rabi crops in UP-AGREES as per SRP

Crops	Area proposed Under Project (ha)	Seed rate (Kg/ha)	Certified Seed requirement (quintals)	SMR	Foundation Seed req-(quintals)	Breeder Seed requirement (quintals)
Kharif						
Til	40300	4	1612	250	6.4	0.03
Ground nut	10600	75	7950	8	993.8	124.22
Urd	29500	15	4425	40	110.6	2.77
Maize* (Hybrid)	35800	20	7160			
Bajra* (Hybrid)	35800	4	1432			
Jowar* (Hybrid)	21800	8	1744			
Arhar	21200	15	3180	40	79.5	1.99
Rice	420000	30	126000	80	1575.0	19.69
Total	**615000**		**153503**	**418**	**2765.3**	**148.7**
Rabi						

Wheat	511000	100	511000	20	25550.0	1277.5
Pea	19000	90	17100	10	1710.0	171.0
Gram	41000	75	30750	15	2050.0	136.7
Lentil	31000	35	10850	15	723.3	48.2
Mustard	13000	5	650	100	6.5	0.1
Total	**615000**		**570350**		**30039.8**	**1633.5**

** Hybrid seeds of notified varieties will be procured every year as per world bank procurement procedure*.

Quantities of certified seeds of identified crops are presented in the Table below

Table 29: Year-wise certified/notified seed requirement of Kharif and Rabi crops in UP-AGREES

Crops	Total Area proposed under Project (ha)	Total Certified Seed requirement (quintals)	Year wise crop area (ha) and certified/notified seed requirement (q)					
			2025-26		2026-27		2027-28	
			Area	Seed	Area	Seed	Area	Seed
Kharif								
Til	40300	1612	11400	456	13300	532	15600	624
Ground nut	10600	7950	3000	2250	3400	2550	4200	3150
Urd	29500	4425	8400	1260	9500	1425	11600	1740
Maize (Hybrid)	35800	7160	10000	2000	11700	2340	14100	2820
Bajra (Hybrid)	35800	1432	10000	400	11700	468	14100	564
Jowar (Hybrid)	21800	1744	6200	496	7000	560	8600	688
Arhar	21200	3180	6000	900	7000	1050	8200	1230
Rice	420000	126000	120000	36000	136400	40920	163600	49080
Total	615000	153503	175000	43762	200000	49845	240000	59896
Rabi								
Wheat	511000	511000	146000	146000	165000	165000	200000	200000
Pea	19000	17100	5400	4860	6000	5400	7600	6840
Gram	41000	30750	11400	8550	13600	10200	16000	12000
Lentil	31000	10850	8800	3080	11000	3850	11200	3920
Mustard	13000	650	3400	170	4400	220	5200	260
Total	**615000**	**570350**	**175000**	**162660**	**200000**	**184670**	**240000**	**223020**

Implementation Arrangements

As already proposed the major objective of the programme will be to ensure availability of quality certified seeds of locally suitable high yielding, short duration, climate resilient varieties not only for the farmers of project area and project period but also for the farmers of outside project area and after the project period also, this would become a major economic activity for FPOs/FPGs involved in seed production programme.

Following steps are proposed to ensure successful implementation of above concept.

- Coordination will be established with UPBVN for this activity.
- Responsibility of establishing sustainable seed production system lies with the DPIU and UPBVN at district level.
- Assessment of crop wise breeder/foundation/certified seed requirement has been done and will be regularly made available to Department of Agriculture/UPBVN to ensure timely availability of breeder/foundation Seeds as per the Seed Rolling Plan.

- DPIU will convert 3-5 Farmer Producer Groups (FPG) in Seed Production Groups in initial stage. It will be later expanded to 5-10 FPG based on the seed requirement of the block.
- State PMU in Collaboration with UPBVN and other technical organisations/ research institutions will organize training programme to develop seed production experts from the technical team of respective DPIU.
- Respective DPIU under guidance of State Project Management Unit (PMU) will establish Seed Hubs in the project area which will be major source of providing Seeds of locally suitable high yielding Varieties even after the completion of project.
- Technical Institutions, State Agriculture Universities, Central Agriculture University, KVKs will regularly provide the technical support in seed production.
- Project Management Unit will assist and guide the implementation of seed production activity at field level.
- State PMU, and Support Organization will ensure that it becomes a profitable venture as sustainable basis.

Sub-Component 1C: Agri-Extension

This sub-component aims to promote tailored agronomic and extension services for climate-resilient practices to reduce risk thresholds and improve productivity of crop systems, diversification, and value-addition. This sub-component will:

(i) Leverage the advisory platform developed as part of sub-component 3A and fund partnerships with leading agricultural universities, national and global institutions (including CGIAR), private sector companies, leading ag-tech start-ups, and farmer collectives to shift from the existing top-down agricultural extension services to hyper-local and crop specific support for farmers. The last-mile service delivery will use a 'phygital model' of digitally enabled real-time advisories delivered through extension service providers at the farm level. Issuance of weather and price related advisory will be targeted in effective manner.

(ii) Krishi Raftar Kendras (KRK) will be established to deliver last-mile services and develop support networks. It is envisaged that KRKs will accomplish two critical tasks: (a) leverage the existing network of public and private firms by collating and redirecting queries from farmers through a dedicated call centre established at the state level; and (b) reduce information asymmetry regarding various financial products and schemes through a combination of field-level cadre, Common Service Centres (CSCs) and existing Business Correspondent Agents (BCAs). The KRK will proactively assist women and youth within and outside the project areas to set-up new or expand existing agri MSEs.

Additionally, the project will benefit from the on-going initiatives of Indian Council of Agriculture Research (ICAR) to strengthen the linkages of higher agriculture education, extension, and research systems developed under the framework of the World Bank supported National Agriculture Higher Education Project (NAHEP).

Delivering the right technology at the right time and place to the right farmers will be a key factor for increasing the quality of production and productivity in UP-AGREES.

Landscape of Extension Services in UP

In Uttar Pradesh, the Departments of Agriculture, Horticulture, Animal Husbandry, Dairy, Sericulture, Fisheries etc are some of the main departments responsible for taking new and relevant technologies and practices to the farmers. In most departments, extension functionaries are burdened with non-extension activities like distribution of inputs and other administrative responsibilities.

Table 30: Landscape of organizations doing farmer extension in UP

Government Extension Agencies	Education and research Institutions	Private Sector	Other Sources
Agriculture	SAUs	Companies	Electronic Media
Horticulture	Research Institutions	Seed	Print Media
Animal Husbandry	KVKs	Fertilizers	NGOs
Fisheries	ICAR Institutes	Pesticides	Farm Schools
Sericulture	International Institutions (IRRI)	Farm Machinery	Lead Farmers

In addition, State Agriculture Universities (SAUs), KVKs and Research Institutions also provide and share the latest technologies and agronomic practices to farmers in areas surrounding them. Input companies dealing in fertilizers, seeds and pesticides have their own product specific extension network. In the last few years, media has also played an active role in taking new technology to the farmers. There are a few good NGOs and even good farmers who also help in taking new technologies and agronomic practices to fellow farmers and are quite effective even though limited in numbers. It is envisioned, that such progressive farmers will play an active role in taking the UP-AGREES project activities to other farmers.

1C.1 Strengthening of Advisory Platform at District and state level

To achieve the envisaged improvement in productivity and diversification of livelihoods, the project will focus on creating an advisory platform at the district and state level that leverages the strength of leading state and central agriculture universities, national and International Institutes, private sector companies, leading ag-tech start-ups, FPOs village level producer groups. The proposed platform will be supported by a robust ICT architecture to ensure that farmers and farmer collectives get the right inputs/information at the right time.

The state has a strong technical back up support with the presence of 4 State Agriculture Universities (SAUs) and 01 Central Agriculture University, National Research Institutes like Indian Institute of Pulse Research (IIPR), Indian Institute of Vegetable Research (IIVR) and

an International Institute (ISARC) at Varanasi. Additionally, there are KVKs in almost every project district. All these Institutions will play a major role in transforming agriculture in the project districts.

The proposed State and District level platforms will ensure that knowledge is regularly updated at the state and district level and that updated and relevant technical know-how is disseminated to the farmers. These forums will also oversee the adoption of new technology and practices on a sustainable basis at the field level and its subsequent impact on farmer's income with mid-term correction if required.

The State level committee/forum shall be responsible for;

- Issuing weather and price advisory.
- Developing area specific crop advisory for each crop.
- Finalizing and developing modes of taking messages/advisory to the farmers.
- Issuing technical guidance as and when required.
- Revising crop advisories based on the feedback from district level Extension Committee.
- Finalizing the state level annual capacity building plan for all the stakeholders.
- Continuous monitoring and supervision of training and review of effectiveness of the system lamp adopted.
- Development of area specific IPM modules for important crops.
- Mid-term course correction of required.

The state level committee will regularly meet (at least twice in a year or as and when it is needed) to continuously update the information and monitor its adoption at field level.

Table 31: Composition of the State Level Technology Dissemination Platform (SLTDP)

Sl	Details of Members	Role
1	Project coordinator, UP DASP	Chairman
2	Project Director, UP-AGREES	Member
3	Director Extension, RLBCAU, Jhansi	Member
4	Director Extension, BUAT, Banda	Member
5	Director Extension, NDUAT, Ayodhya	Member
6	Director Agriculture, GoUP	Member
7	Director Horticulture, GoUP	Member
8	Director Fisheries, GoUP	Member
9	Director, IMD, Regional Centre, Lucknow	Member
10	Director, IAS (BHU), Varanasi	Member
11	Representative form ISARC, Varanasi	Member
12	Representative form IIVR Varanasi	Member
13	Representative form IIPR Kanpur	Member
14	State level representative of major input/ Technology providers & marketing companies	Member
15	Technical Expert Agri Business, UP-AGREES	Member
16	Technical Expert, Agriculture UP-AGREES	Member Secretary

District Level Extension Platform (DLEP)

UP-AGREES will also have a **District level Extension Platform (DLEP**) with the following members.

Table 32: Composition of the District Level Extension Platform (DLEP)

SI	Details of Members	Role
1.	Chief Development Officer	Chairman
2.	Deputy Director Agriculture	Member
3.	District Horticulture Officer	Member
4.	Assistant Director, Fisheries	Member
5.	District In-Charge/Asst. Director Fisheries	Member
6.	In-Charge KVK	Member
7.	Members from FPOs/Crop Clusters	Member
8.	Leading farmers (2)	Member
9.	NGO representative	Member
10.	Representative from Private Sector	Member
11.	Project Manager UP-AGREES	Member Secretary

The district level committee/forum will ensure;

- Weather and price based advisory reach to farmers.
- Crop advisories reach to the farmers/FPGs/Clusters.
- Amend the advisories as per local need with information to state level forum.
- Prepare and get approval for the Annual Training and Capacity Building Plan for each stakeholder.
- Supervision of extension activities and its proper implementation.

At the block level, the Support Organization will be responsible for taking the package of information to the farmers/Farmer Producer Groups (FPG). The Support Organization will also ensure proper training of its technical staff in various digital Tools, Web based applications, and various technologies needed to take the technologies and agronomic practices to the farmers/farmer groups.

1C.2 Partnership with Technical Institutions

UP-AGREES will leverage the advisory platform developed as part of sub-component 3A and fund partnerships with leading agricultural universities, national and global institutions (including CGIAR), private sector companies, leading ag-tech start-ups, and farmer collectives to shift from the existing top-down agricultural extension services to hyper-local and crop specific support for farmers. The last-mile service delivery will use a 'phygital model' of digitally enabled real-time advisories delivered through extension service providers at the farm level.

Partnerships with Technical Institutions

The UP-AGREES project will provide various interventions in the field for the upliftment of farmers' productivity, their income as well as quality of life. Presently various institutions are operating at the State, National and International levels, with a similar objective and with long experience in the same. This experience can be utilized by UP-AGREES by developing partnerships with these esteemed institutions.

Considering the reputation of these institutions, bringing them through competitive bidding may not be feasible as they might not respond positively. Therefore, UP-AGREES will form partnerships with these technical institutions through a collaborative and coordinated approach to ensure their best participation.

The project will make an inventory of such institutions along their field of specialization which meet the project requirements. The project will make efforts to seek the interest of these institutions to provide their knowledge support and request them to share a proposal with the services they will provide along with the cost involved.

Approaching on an agreement with these institutions, a service contract will be made detailing their involvement along with schedules of delivery and related financials.

These Institutions will play a major role in disseminating the best of their knowledge regarding technologies and agronomic practices to the UP-AGREES project farmers and provide technical back up support not only during project period but also after the project is over.

As the FPGs are critical in the successful implementation and continued adoption of innovations, e-learning, training and exposure visits will be carried out in partnership with the technical institutions in order to build their capacity. UP-AGREES also aims to create master trainers to cater to the training needs in various fields e.g. mechanization (e.g. direct seeded systems), facilitate local entrepreneurship (e.g. local sees, bio-inputs, etc.) and extension systems (e.g. KVK, Department of extension, FPOs, etc.). In addition, the project will benefit from on-going initiatives of the ICAR to strengthen linkages of higher agriculture education, extension and research systems under the framework of World Bank supported ongoing National Agriculture Higher Education Project (NAHEP).

The project aims to create a comprehensive and sustainable digital agriculture ecosystem in the state, driven by advanced data analytics and decision support systems. Some specific digital applications that will be created through the project partnerships with technical institutions are:

a) **Web-GIS dashboard** for targeting, monitoring and decision support. (A Web-GIS portal is an interactive map interface that allows users to access, visualize, analyse, and interact with geographic information and generate spatial database-based information through a web browser. The web-GIS platform will have the capacity to integrate spatial datasets as well as other associated data).
b) **Rice wheat crop manager** (RWCM). RWCM is a web-based decision-making tool based on site specific nutrient management principles and is designed for farmers who cultivate rice and wheat crops. By using this tool, farmers can adjust their fertilizer application taking account of crop requirements and spatial and temporal variability. It provides personalized crop and nutrient management

recommendations to help farmers increase their rice production and income. The goal of RWCM is to sustain the productivity of the rice-wheat cropping system while increasing the net income of rice and wheat farmers in Eastern Uttar Pradesh, by offering better crop and nutrient management solutions to farmers.

c) **Easy Harvest,** a web-based tool for smart linkage among farmers and service providers. (It is also used for scheduling different machines for optimal service provision corresponding to the needs of farmers, and assures availability of service providers, combined with predictions of farm conditions, anticipated transplanting/harvesting times, and available infrastructure. The Easy Harvest app will help customize machinery use, with a 10-20% reduction in rice production cost, 1-2% reduction in post-harvest losses and 2-5% reduction in GHG emissions from rice production).

Roles and Responsibilities of the Technical Institutions

The roles and responsibilities of these institutions will include but not be limited to the following:

- Develop crop wise area specific -advisories for each crop
- Develop area specific Weather based agro-advisories
- Develop Crop Specific Training modules for all stake holders i.e. Project functionaries, Staff of Support Agencies, Farmers, Group Leader, FPGs, and FPOs
- Provide training as per prepared training modules to all stake holders
- Organise a customized training and capacity building programme for Support Agencies to develop Master Trainers at field level
- Assist Support Organization in demonstrating new technologies to the farmers/farmers group
- Assist in organizing Field Days/Harvest Events/Crop Cutting Experiments/Exposure visits etc.
- Ensure availability of breeder/foundation seed to the identified Farmer Producer Groups for Certified/Truthful seed production programme as per allocation of GOI
- Develop crop wise modules/demonstrations of improved agriculture practices at field level
  - Direct Seeding of Rice (DSR)
  - Zero Tillage Wheat
  - Line Sowing in Wheat
  - Pulses cultivation on raised bed
  - Integrated Pest Management (IPM)
  - Weed Management
  - Macro and micro irrigation system management
  - Timely Sowing
  - Soil Test Based Fertilizer application

  - Crop Residue Management
  - Soil Amendments
- Capacity building of FMBs for functioning as Custom Hiring Centres Developing Capacity Building Programme for Farm Machinery Mechanics
- Assist in Impact Assessment and various Documentation
- AI empowered crop management system to address productivity challenges
- Mobile based extension services
- Development of comprehensive and sustainable digital agriculture eco-system
- AI empowered crop management systems, data-based predictive modelling, and decision support systems will be deployed to address productivity challenges.
- Mobile applications-based extension services for redressing the productivity conundrum arising out of lack of knowledge on suitable agronomic practices.
- Price based advisory to farmers.

These Institutions or consortium of institutions will be provided funds as per agreed terms duly documented in the agreement or MOU made between them and UP-AGREES.

1C.3 Krishi Raftar Kendra (KRK)

Krishi Raftar Kendras (KRK) will be established to deliver last-mile services and develop support networks. It is envisaged that KRKs will accomplish two critical tasks: (a) leverage the existing network of public and private firms by collating and redirecting queries from farmers through a dedicated call centre established at the state level; and (b) reduce information asymmetry regarding various financial products and schemes through a combination of field-level cadre, Common Service Centers (CSCs) and existing Business Correspondent Agents (BCAs). The KRK will proactively assist women and youth within and outside the project areas to set-up new or expand existing agri MSEs.

The Krishi Raftar Kendras (KRKs) will be a two-tier farmer support system providing through UP-AGREES.

Tier 1 – State Level Call Centre

A state level call centre will be established for supporting farmers for all agronomic aspects including production, input supply, crop advice, pest control issues, access to finance, weather, market linkages, FPG/FPO issues, local contacts etc.

The call centre will act as a nodal point of contact for all UP-AGREES farmers, whereby the call centre executive will either solve the issue themselves or leverage the existing network of public and private firms by redirecting queries to the right contact. The call centre will complement and support the on-ground implementation team and connect the farmers who call to them for resolution of their issues on ground.

The call centre will be located in Lucknow and the number for this call centre will be widely marketed through the UP-AGREES project marketing collaterals. Appropriate knowledge resources and databases will be collated and created, partnerships established and related trainings conducted of the call centre teams to successfully operationalize the call centre.

Even though initially the call centre will be created for UP-AGREES farmers, it will eventually cater to all the farmers in UP.

Tier 2 – Convergence with on-ground resources of existing schemes for last mile delivery of services

The aim will be to reduce information asymmetry regarding various financial products and schemes through a combination of field-level cadre, Common Service Centers (CSCs) and existing Business Correspondent Agents (BCAs). Preference will be given to co-option of such existing service providers/facilitators already embedded in different public or private sector programs (NRLMs: FL-CRP/BC Sakhi/Udyam Sakhi/BDSP etc, SIDBIs Certified Credit counsellors, Common Service Centre VLEs etc).

These facilitators will be equipped with suitable training content and a technology tool (device) which will provide varied requisite information and help in tracking progress through Management Information System and Monitoring & Evaluation. Initially, these facilitators will be provided fixed and/or variable payments/honorarium by the project. Later, the facilitator will steadily price their services to villagers to finance their activities and earn their livelihood.

In particular, the facilitators will support the following activities:

- Convergence by helping in adoption of various government schemes including subsidy schemes and financial service providers such as business correspondent agents, insurance providers etc
- Improving financial awareness, literacy and education to improve financial well-being of the household by acting as a 'financial counsellor'
- Identification of potential borrowers/beneficiaries of financial instruments such as Challenge Fund and provide support in identification of their business plans and credit proposals
- Supervise and monitor project activities and liaison with financial institutions and other government department to enable convergence of schemes
- Provide support for Agri Finance such as eKCC, onboarding of farmers through Banks and Agi Financing
- Quality management of project activities through MIS and M&E work
- Coordination with TSAs of other interventions and units within UP-AGREES
- Proactively assist women and youth within and outside the project areas to set-up new or expand existing agri MSEs.

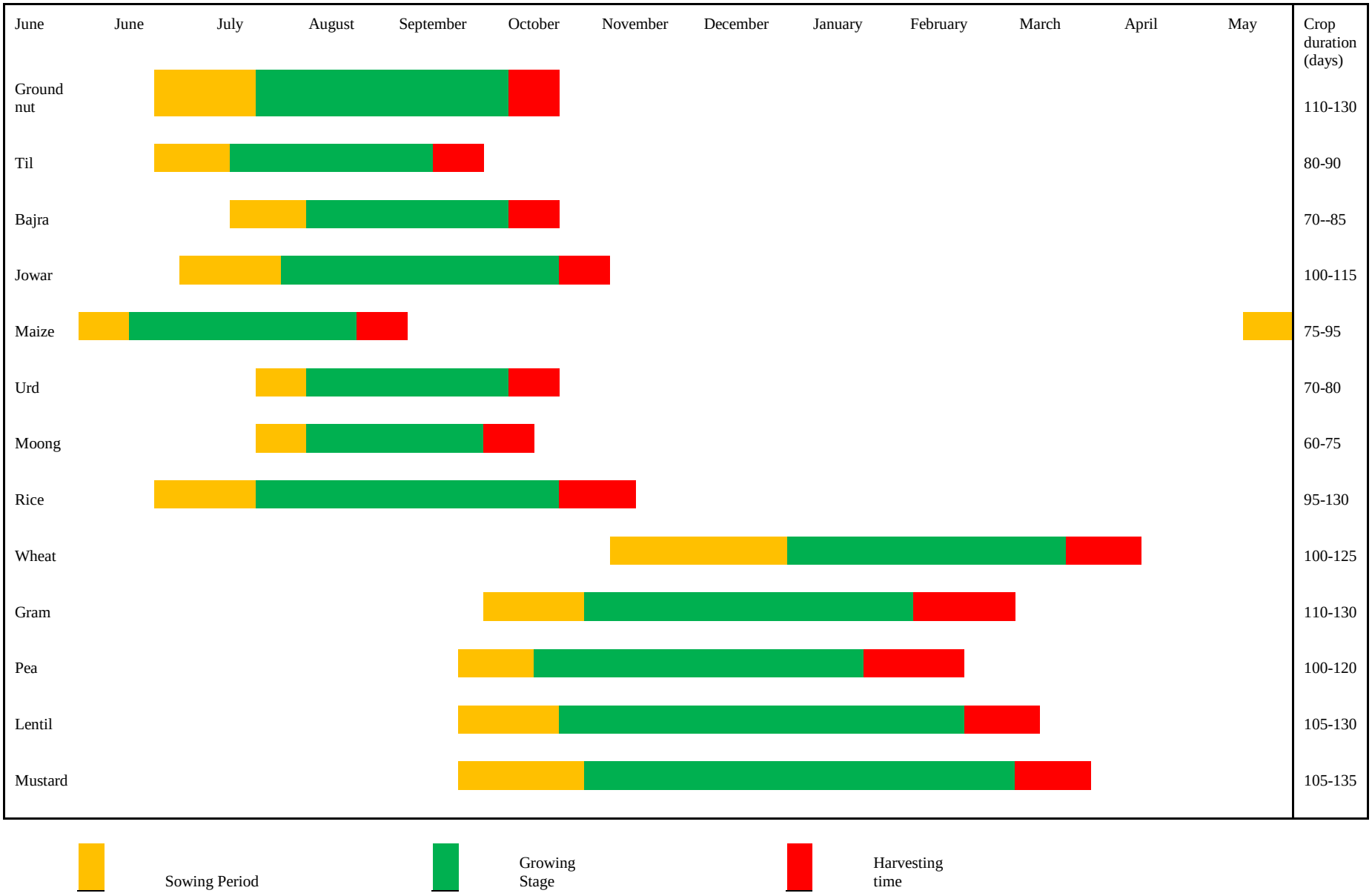
Implementation Arrangements

- Support Organization placed in the district will be responsible for taking new technology to the farmers.
- State PMU in consultation with Partner Technical Institutions will develop detailed capacity building programme for the Support Agencies.
- Training Programme will be conducted by the Partner Technical Institutions.
- All the Training Programme will be in Training of Trainers (TOT) mode.
- Trained Technical Staff of Support Organization will develop a Training Calendar and organize Training Programme at Farmer Producer Group level as per the training calendar.
- In each FPG, a progressive and wiling farmer will be trained and developed as Lead Resource Person (LRP) who will assist in dissemination of new technology to the remaining farmers of the group.
- The lead farmer will follow the principles of Learn, Adopt and Disseminate.
- State PMU will be responsible for developing crop advisories, mobile apps like Crop Manager / Crop Doctor, or other Web based extension tools with assistance from Partner Technical Institutions.
- District Project Implementation Unit will assist Support Organization in Implementation of this activity and will ensure that Farmers/Farmer Groups/FPOs are constantly trained in new relevant technology and their adoption in the field is visible on sustainable basis.
- District level committee and state PMU will regularly supervise and ensure continuous flow of information to the project beneficiaries.
- District Project Implementation Unit will also develop a meeting schedule of FPG and ensure its implementation with the help of LRP and Technical Staff of Support Organization.

Table 33: Year-wise extension services financial arrangement

Sl No	Component	Unit	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	Total
1	Extension services for climate smart agriculture	**Rs in lakh**	2500	5000	5000	5000	5000	2500	**25000**

Table 34: Crop Growing Period for major UP-AGREES crops



Implementation Model

Field Level Implementation Model

123 Blocks will be selected in the 28 UP-AGREES Project Districts based on lower productivity and large area coverage. As already discussed in the project management component, 4-5 blocks will be taken up under component-1 depending upon the number of blocks in the districts. There will be a District Project Implementation Unit (DPIU) at the district level.

Support Organization:

In all three phases of UPSLRP, associating Support Organization (SAs) for facilitation of the project activities was found beneficial. In UP-AGREES, it is planned to adopt a similar strategy. The SAs will be engaged for facilitating and implementing the project activities, both social mobilization and agriculture technology dissemination, in the selected blocks villages.

It is proposed to place a Support Organization for each district which will not only be responsible for providing technical support to the farmers but will also help in mobilizing farmers, form farmer producer groups (FPG), launch awareness campaigns, organize farmers meet, carry out capacity building and marketing activities.

In each district, the selected Support Organization will place suitable and competent team as per the requirement of the project activities and objectives. The Support Organisation and its' deployem team will seek guidance from the District Project Manager as well as from the State PMU.

Selection of SAs will be based on the criteria mentioned below, which may be changed as per the need of the project:

Eligibility Criteria for Support Organization

1. The agency should be a registered body under the relevant State/National act and is active and operational continuously for the last 5 years on the date of application;
2. The agency should have maintained and properly audited its books of accounts / accounting records and annual statements of income and expenditure should have been prepared;
3. The agency should have at least 5 years of in carrying out social mobilization in rural area, agriculture technology dissemination and agri-business development;
4. The agency should have working experience with Small & Marginal farmers, women and agriculture development issues;
5. The agency should have a minimum annual turnover of INR 1.00 crore, on an average for the last three years (based on annually audited statement);

6. The agency should not have been blacklisted from any Government (Union and /or State), Ministry / Department / Agency / Multinational donor NGO or any other donor / partner organization in the past;
7. The SA should be non-political and secular in nature;
8. The SA should have demonstrated experience in community development, in training and capacity building, in technology dissemination and agri-business development in convergence with Agriculture and allied sector departments and Agencies;
9. The SA should have a operational establishment in Uttar Pradesh at the time application; and
10. The organization should have specialists suitable for social mobilization and agriculture technology dissemination and agri-business development.

Roles and Responsibilities of Support Organization

The role of Support organization is to facilitate the project implementation process in association with Farmer Producer Groups (FPGs) / FPOs.

Implementation Timeline

Table 35: Component 1 implementation timeline

S. No.	Activities	Yr 1	Year 2				Year 3				Year 4				Year 5				Year 6			
0.1	Block/Village Selection																					
0.2	Motivatuion and awareness campaign																					
0.3	Crop and Beneficiaries Selection																					
0.4	Formation of FPGs																					
1																						
1.1																						
1.1.1	Baseline soil testing																					
1.1.2	Green manuring																					
1.1.3	Soil amendments [gypsum]																					
1.1.4	Crop residue management																					
1.1.5	Micro-nutrients																					
1.2																						
1.2.1	Micro watershed approach in Bundelkhand																					
1.2.2	Bunding and laser land levelling in Eastern UP																					
1.2.3	Bio fertilizer																					
1.2.4	Conjunctive water use																					
1.2.5	Micro-irrigation (Convergence with UPMIP)																					
1.3																						
1.3.1	Farm Machineries																					
1.3.2	Plant protction / IPM Approaches																					
2																						
2.1																						
2.1.1	Seed rolling plan based on assessment of seed requirement																					
2.1.2	Capacity building of seed producing groups for quality seed production and distribution																					

2.1.3	Seed hub for seed processing and employment generation																						
2.1.4	Developing enterprise FPGs for seed																						
2.2																							
2.2.1	Assessing and distributing group wise requirement																						
2.2.2	Ensuring availability and access of quality seeds																						
3																							
3.1																							
3.1.1	Strengthening of Advisory Platform at District Level																						
3.1.2	Strengthening of Advisory Platform at State level																						
3.2	***Partnerships with Technical Institutions***																						
3.2.1	Capacity building / Training programmes																						

Key Outputs

Outcomes:

- Increased productivity of leading crops
    - Bundelkhand: Groundnut, Sesame, Urad (Kharif); Gram, Pea, Lentil (Rabi)
    - Eastern UP: Rice, Maize, Vegetables (Kharif); Wheat, Mustard, Vegetables (Rabi)
- Development of a seed multiplication and distribution system
    - Partnership protocol on sustainable rolling plan of climate resilient and high yielding seeds.
    - Improved varietal replacement with promotion of late sowing early maturing varietis.
    - Link to State seed grid / network
    - Build a cropping systems approach for Kharif and Rabi seasons
- Promote climate-smart agronomic advisory and extension services with special focus on weather and price advisory.

Expected Outcome

- Achieve targeted SRR and VRR with the enhanced availability of quality seed.
- Enhanced input use efficiency as in the absence of quality seed, the investment on fertilizers, water, agrochemicals, and other inputsdoes not pay the desired dividends.
- Higher crop production and productivity.
- Entrepreneurship development on specialized seed production activities

Risks and Mitigants

A. Climate Change

1. Eastern UP, Bundelkhand and Vindhyachal are vulnerable to climate variability, including erratic rainfall and extreme weather events / condition.

- ***Mitigation***
    - Study of climate data, planning of agriculture accordingly,
    - Promotion of Stress tolerant, climate resilient varieties,
    - Establishment of water efficient System

B. Technological Adoption

Farmers may be resistant to adopting to new climate resilient technologies due to lack of awareness or traditional farming practices

- ***Mitigation***
    - Extensive exposure to farmers
    - Incentives for adoption of climate resilient technologies

C. Large number of farmers with very small holdings

More than 93 % of the farmers fall in Marginal and small category

- ***Mitigation***

- Working through farmer collectives/farmer Producer Groups
- Assistance through the project for input arrangements

D. Financial Constraints

As farmers have small holdings, may not be able to contribute in schemes of micro-irrigation.

- ***Mitigation***
  - Linking such farmers with banks/financial Institutions
  - Community involvement

E. Policy or Regulatory Challenges may disrupt the implementation

- ***Mitigation***
  - Alignment of project goals with existing policies
  - Advocacy for supportive policies for climate change

F. Inadequate Infra structure

Inadequate storage and transport may pose a problem

- ***Mitigation***
  - Dovetailing with existing schemes
  - Assistance from the project

G. Socio-cultural factors

Cultural practices and social outcome of the project

- ***Mitigation***
  - Involvement of local communities in planning and implementation
  - Customize interventions with local customs and traditions

H. Marketing of Surplus produce

- ***Mitigation***
  - Working through FPG/FPOs
  - Linking FPGs/FPOs with market Agencies

I. Monitoring and evaluation

Inadequate monitoring and evaluation can lead to ineffective project outcome

- ***Mitigation***
  - Development of robust monitoring and evaluation framework with clear indicators and milestones
  - Regular / concurrent monitoring and necessary adjustments / mid-course corrections.

Sub-Component 1D: Leveraging Climate Action Mechanisms

This sub-component will be informed and guided by the UP-Accelerator-led initiatives to leverage carbon and sustainability (green) credits from climate-smart agriculture leveraging economic dividends for project beneficiaries promoting sustainable, low-Carbon agricultural

operations including direct seeding in rice wheat systems, minimal tillage, soil management, water conservation and increased WUEs through micro irrigation.

The focus of activities and initiatives under this component will be to enhance capacities of farmers and other stakeholders including research institutions and state agricultural universities to participate in the generation of high quality, verifiable, carbon credits to leverage the domestic or international carbon markets.

In terms of implementation, these activities will be twin faceted – farmer facing and market facing. Farmer facing activities will include the establishment of infrastructure at the field level e.g. data collection, crop modelling, farmer capacity building and partnerships (universities, research organizations and private sector). A consortium of partners is envisaged, whereby all partners can be brought on board.

The project component will guide the establishment of a Center for Climate Resilient Agriculture Systems (C-CRAS), a first-of-its kind centre in Asia that will build capacities of state government institutions to develop and standardise protocols for measurement, monitoring, reporting and verification of carbon credits, a key enabler for generation of high-integrity, charismatic carbon credits that can fetch a premium for the State's smallholder farmers in global markets. The component activities will also inform and guide the development of strategies, policies and investments in the State in agriculture and land use sectors through independent R&D services. The component will adopt a platform approach to work with private sector Agri-value chain leaders, Carbon credit aggregators, Technology companies, Startup community, domestic and global academia and research agencies of repute, Farmer Producer Organisations and last-mile service delivery agencies.

The component will be able to generate a steady stream of demand for high-value carbon credits, both from the UP-AGREES project activities in the clusters identified and create Digital Public Goods that will bolster the State's position as a leader in climate-tech and just-transition. It will work with the Artificial Intelligence-hub established by the Government of Uttar Pradesh in partnership with technology leaders in this field.(eg. Like Microsoft, Google, TCS, HCL, etc.)

Building further from the advances made by technology firms in the areas of mapping Soil Organic Carbon (SOC) and soil nutrient profiles, the activities under this component will enable the development of a comprehensive village-level Carbon account, combining the field-level emissions values and SOC stock. Data sets capturing static and dynamic values of carbon stock and emissions will help prioritise and target public subsidies of the government to promote natural, regenerative or sustainable agriculture, effectively.

At the domestic level, this would mean enabling emission reduction from farm-level projects to be eligible under India's Green Credit Programme (GCP) under the Sustainable

Agriculture based Green Credits. At the global level, this would entail making these emission reduction activities to be registered across international voluntary carbon markets. It is anticipated that the UP Accelerator-led registry will connect to carbon and green credit registries bringing a unified platform for credits in climate-smart agriculture.

The sub-component will finance the following:

(i) Technical assistance for design and establishment of C-CRAS to build the capacity of relevant government departments and stakeholders in Uttar Pradesh for measurement, monitoring, reporting, and verification of GHG emissions in the agriculture sector in UP. C-CRAS will facilitate establishing a digital Measurement, Reporting, and Verification (MRV) system, which, in turn, is expected to play an essential role in farmers' participation in voluntary carbon markets.
(ii) Necessary Laboratory equipments and data acquisition as per requirements.
(iii) The necessary scientific and technical studies to calculate the volume of emissions reductions and preparing the required verification protocols.
(iv) Promoting regenerative agriculture.
(v) Capacity building through workshops, webinars, and training programs for stakeholders in collaboration with global and local experts.
(vi) Provision of technical assistance to provide farmers' access to voluntary carbon markets.

Background

Soil-water management, methane emissions reduction from agriculture, and stress tolerance in agriculture are identified and highlighted as key areas of interest and action by the State Action Plan on Climate Change (SAPCC) of the GoUP[21].

UP-AGREES will enable the government to build on this climate ambition as outlined by the Honourable Chief Minister and the State Action Plan on Climate Change to leverage the benefits of carbon markets for small and marginal producers in Uttar Pradesh.

Green Credits

Uttar Pradesh has about 6-million-hectare area under rice cultivation and of this maximum area is irrigated and has a puddled situation. UP-AGREES through environmentally conscious project interventions will enable the State to assume a position in sustainability and positive climate action. The Government of India, through a Gazette Notification has shared its intent to create a market-based mechanism for providing incentives in the form of Green Credits to individuals, Farmer Producer Organisations, cooperatives, forestry

[21] Available online at: https://moef.gov.in/wp-content/uploads/2017/09/SAPCC_UP_final_version_0.pdf

enterprises, sustainable agriculture enterprises, and organisations for environment positive actions[22].

The Green Credit regime will among others, cover interventions such as **Water-based Green Credits** to promote water conservation, water harvesting and water use efficiency/savings, including treatment and reuse of wastewater and **Sustainable Agriculture based Green Credits** to promote natural and regenerative agricultural practices and land restoration to improve productivity, soil health and nutritional value of food produced.

In agriculture and water sectors, UP-AGREES implementation plan has identified several mitigation opportunities that can generate carbon credits, such as reducing tillage, improving soil management, adoption of micro irrigation and water conservation strategies such as conjunctive water use, sustainable rice cultivation and increased adoption of renewable energy sources in farm practices and post-harvest operations.

According to the State of Voluntary Carbon Markets report by Ecosystem Marketplace, the agriculture sector accounted for 7% of all voluntary carbon market transactions in 2020, with a total of 7.5 million carbon credits issued. The report also highlights that the demand for carbon credits from agriculture is increasing, with buyers looking for projects that have co-benefits such as biodiversity conservation and community development.

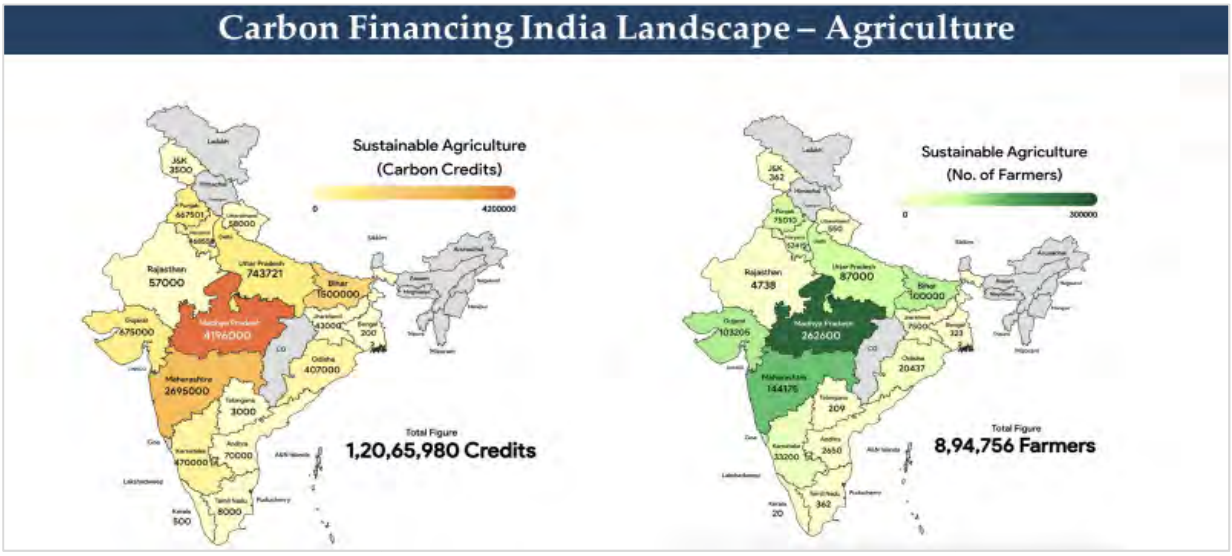
Figure 19: Voluntary Carbon Market Transaction Volumes and Prices by Category: 2020-2021

	2020			2021		
	VOLUME (MtCO2e)	PRICE (USD)	VALUE (USD)	VOLUME (MtCO2e)	PRICE (USD)	VALUE (USD)
FORESTRY AND LAND USE	57.8M	$5.40	$315.4M	227.7M	$5.80	$1,327.5M
RENEWABLE ENERGY	93.8M	$1.08	$101.5M	211.4M	$2.26	$479.1M
CHEMICAL PROCESSES / INDUSTRIAL MANUFACTURING	1.8M	$2.15	$3.9M	17.3M	$3.12	$53.9M
WASTE DISPOSAL	8.5M	$2.69	$22.8M	11.4M	$3.62	$41.2M
ENERGY EFFICIENCY / FUEL SWITCHING	30.9M	$0.98	$30.4M	10.9M	$1.99	$21.9M
HOUSEHOLD / COMMUNITY DEVICES	8.3M	$4.34	$36.2M	8.0M	$5.36	$43.3M
TRANSPORTATION	1.1M	$0.64	$0.7M	5.4M	$1.16	$6.3M
AGRICULTURE	0.5M	$10.38	$4.7M	1.0M	$8.81	$8.7M

Source: State of the Voluntary Carbon Market 2022: Ecosystem Market Place[23]

[22] Available online at: https://moef.gov.in/wp-content/uploads/2023/06/Draft-GCP-Notification-Inviting-Comments-27062023.pdf
[23] Available online at: https://www.ecosystemmarketplace.com/carbon-markets/

Figure 20: Carbon Financing India Landscape - Agriculture



Source: Research and consultation inputs, 2022, 2030 Water Resources Group

In partnership with the private sector, technical agencies such as ICAR, CGIAR and UPCAR, UP-AGREES will establish the protocols for leveraging green/carbon credits for small and marginal producers in priority value chains. The open architecture established with the support of the World Bankmay also ensure the participation of private sector corporates, Farmer Producer Organization (FPOs) buyers and regulators.

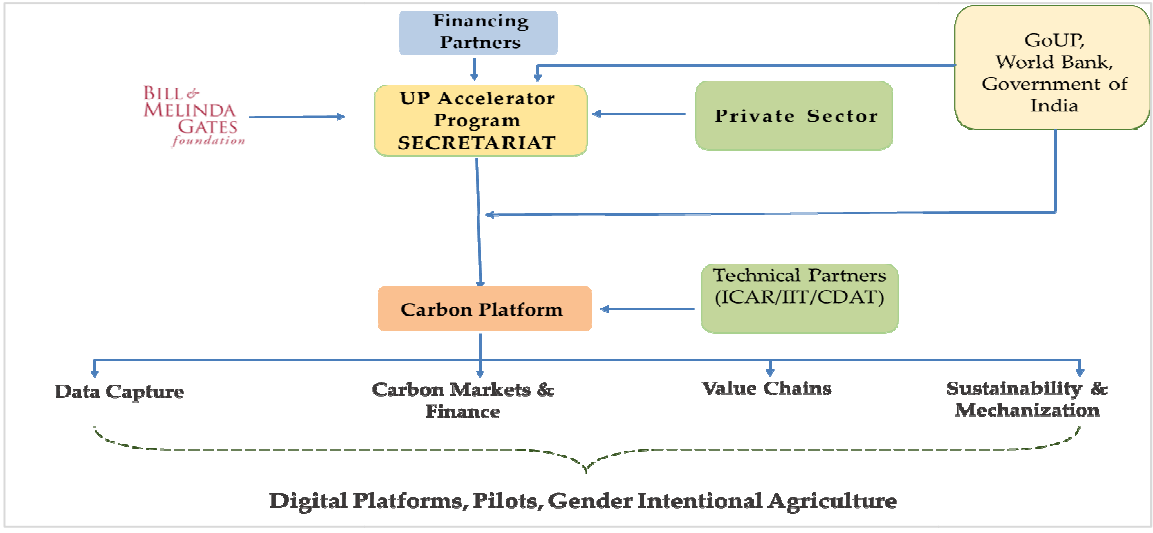


Figure 21: Indicative structure for UP Sustainability Platform enabling green/carbon credit transactions for small and marginal producers

Center for Climate Resilient Agriculture Systems (C-CRAS)

The Center for Climate Resilient Agriculture Systems will be set up by the UP Government with the support of UP-AGREES with a view to support and carry out the following activities:

1.. Identify and promote the adoption of climate-smart agricultural practices that can reduce GHG emissions and enhance carbon and nitrogen capture and storage in agro-ecosystems.

2.. Guide and measure changes in soil organic carbon content, value chains, and strengthen resilience to climate change and variability.

3.. Provide analytics and evidence for climate smart agriculture policy frameworks and incentives for farmers to participate in the domestic and international carbon markets.

4.. Enable farmer participation in global and domestic carbon markets by providing independent technical support and guidance to farmers.

5.. Partner with agri-tech companies or project developers that can measure, verify, and certify the carbon credits generated by the farmers.

6.. Facilitating the generation and protecting the integrity high quality carbon credits from climate smart agriculture in UP.

7.. Brokering domestic and global academic-industry partnerships that will make cutting-edge technologies available for farmers in the areas of GHG management and sustainable agriculture.

Implementation Details

In particular, the C-CRAS will carry out the following specific activities:

- Develop the matrix to help in generated carbon credits and incentives accordingly.
- Assist in creating a System for low-Carbon practices in agriculture in UP, which will ensure the production of high-quality carbon credits. This initiative will be supported through a partnership with global and local institutions including the ICAR, State Agricultural Universities, UP Council of Agricultural Research and the Departments of Agriculture and Horticulture.
- Lead in knowledge management, training and capacity building of stakeholders including farmers, civil society organizations, research scholars and government officials of Uttar Pradesh.
- Help in aligning the global and domestic voluntary carbon markets including standards prescribed by VERRA, Gold Standard and Indian Climate Change Trading Scheme (CCTS) with the climate-smart project initiatives in UP.
- . The C-CRAS will help the project developers and FPOs/farmers generate high quality carbon credits from various agricultural or allied enterprises, utilizing the methodological framework developed by the Centre. Detailed operational guidelines and manuals for generating high-quality Carbon Credits will be produced by the Center.
- In partnership with the academic-research institutions and the private sector, C-CRAS will forge partnerships with global and national research institutions to create a network for building knowledge and capacity on GHG.
- Field a multidisciplinary and multisectoral consortium of leading scientists and agricultural stakeholders, led by researchers at the IRRI-ISARC and implemented together with state-and-national level partners.

Component 2: Commodity Clusters

A majority of the population (51.5%) of UP is engaged in agricultural livelihood activities with limited opportunities for alternate sources of livelihood, particularly in Eastern UP. Producers face multiple constraints such as high rates of indebtedness, lack of alternative sources of income, and limited access to real-time markets, among others. The development of agro-clusters generates opportunities for income and employment and supports entry into high-value commodities.

The objective of this component is to support the integration of smallholder farmers into value chains for select high value commodities, thereby increasing yield, value addition, and farmers' incomes. The component will aim to address the current fragmentation of production and market activities in the sector, and to take advantage of the state's potential to increase the commercialization of select high value crops, both in domestic and export markets.

The approach taken will be to identify and support 'commodity clusters', which are networks of producers, agribusinesses, and public institutions within a defined geographic area engaged in the same agricultural subsector. At the core of this approach is the interlinkage between the producers and the private off-taker (including mainstream national and international private sector entities), whether that be an aggregator, agri-processor, exporter, or retailer. This partnership will be supported by production and market-based service providers, both public and private. By supporting strategic clusters, the aim is to build upon the existing competitive advantage of selected commodities and enhance these through working across the clusters. The component will support (a) crop clusters, and (b) fisheries to enable public sector investments to address existing market failures and ensure business viability and sustainability.

The project will finance investments in agribusinesses by issuing a call for proposals to aspiring entrepreneurs or start-ups, FPCs (and other eligible farmer or fisher groups), and / or agribusinesses seeking to invest further in their value chains and require the support of the project to do so. The project will also support small on-farm value addition opportunities through the Krishi Raftar Kendras. Dedicated Cluster Planning and Implementation Teams (CPITs), with requisite technical and commercial skills, will be in place to implement the component. This component will utilize the existing knowledge developed by national and international agencies such as the Food and Agriculture Organization (FAO), Network of Aquaculture Centers in Asia Pacific (NACA), etc. to augment the capacity of CPIT, as needed.

Sub-Component 2A: Crop Clusters-Agri Special economic zones:

Background

Agricultural activities are the main livelihood activities for a majority of the population of UP with limited opportunities for alternate sources of livelihood, particularly in Eastern UP. UP has favourable agro-climatic conditions for growing diverse crops. Despite favorable production conditions, there are only few high-value agriculture commodities that find a place in premium markets. Additionally, commercialization of smallholder production is also constrained due to:

- Fragmentation of production
- Low and varied quality of production due to lack of inputs and management practices
- Lack of forward linkages and uncertainty of market opportunities
- Lack of aggregation and post-harvest practices

Although UP has one of the highest numbers of enterprises in the MSME sector, the sector is underperforming in agri-processing as investment is constrained by:

- Unreliability of supply (quantity and quality)
- Weak forward and backward linkages
- Policy and operational constraints for investors

This sub-component will finance:

(i) Diagnostics to identify products and geographies for the clusters, based on key criteria including market demand and opportunities (both for domestic and export markets), local agro-ecological conditions, farmers, and agribusiness willingness to invest. The project has identified a few 'first mover' clusters.

(ii) Preparation of climate sensitive Cluster Development Plans to identify activities and develop detailed implementation plan for each cluster selected under the project.

(iii) Implementation of activities under Cluster Development Plans, including inter alia, producer technology for increased productivity and market orientation (such as improved quality and access to seeds, production management practices, farm mechanization, and IT-enabled services); strengthening agribusiness technology and facilities (such as rehabilitation of assets, micro-irrigation, processing facilities, storage, and market development) through private enterprise promotion; institutional strengthening and market-oriented capacity development of FPGs; and technical advisory for agribusinesses to improve market intelligence and forward and backward linkages (for domestic and export markets), branding, packaging and quality control.

Objective

The key objective of this component is to demonstrate approaches to transform the sector to enable strengthening of value chains and generation of higher-value products.

Guiding Principle

The approach taken will be to support 'crop clusters', which entail networks of producers, agribusinesses, and public institutions within a geographic area that are engaged in the same agricultural subsector (as shown in figure 1). Crop clusters to be supported will be selected based on:

- Commodities with existing marketable surplus, potential value addition, and market opportunities
- Areas with high potential for production and access to markets
- Existing production base and private sector interest

The support principles for crop clusters are as follows:

- Value chain approach (pre-production, production, post-harvest, processing, storage, handling, packaging, marketing)
- Targeted at selected farmers / FPGs and private enterprises
- Support and investments tailored to needs of each cluster
- Piloting for proof of concept and subsequent scale up

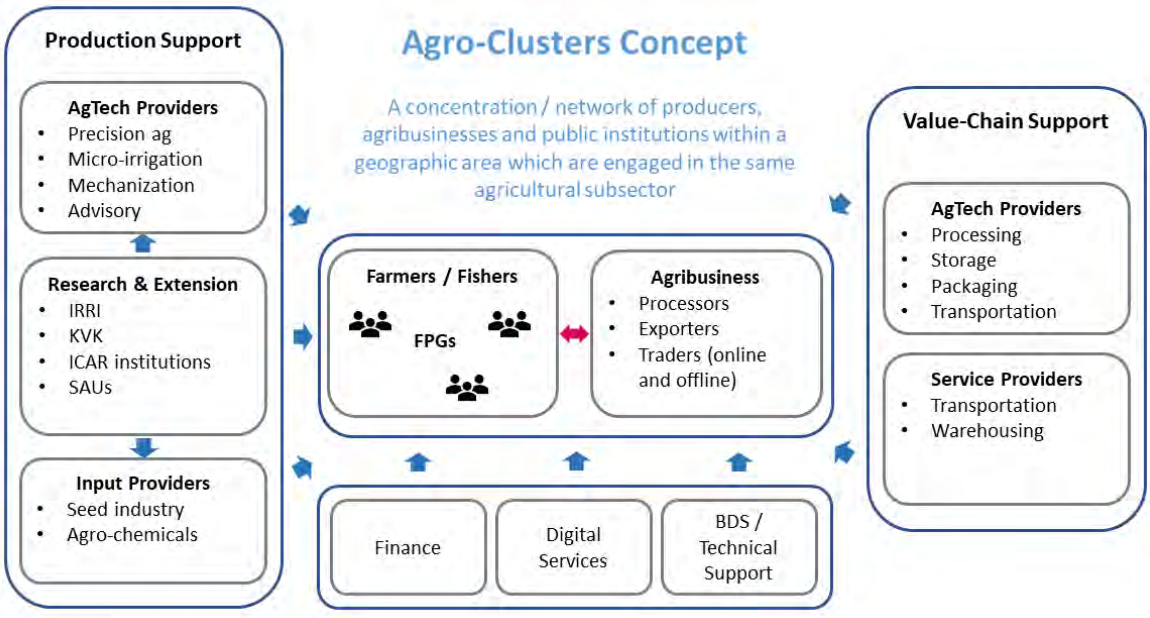


Figure 22: Crop clusters Concept

An agro-cluster is a concentration or a network of producers, agribusinesses and public institutions within a geographic area which are engaged in the same agricultural subsector. The linkage between farmers and agribusiness is supported by various support services. The value chain support services include finance service providers, digital service providers, technical support providers to farmers and agri-business etc.

2A.1 Identification of Commodities and Regions for Interventions

The commodities have been and will be identified and selected based on the following selection criteria:

- **Existing marketable surplus:** An adequate market surplus of the commodity should be available to ensure a consistent supply to the buyers.
- **Ready market:** There should be an increasing demand and existing market (domestic and global) for the commodity.
- **Growing area:** There should be an increasing trend in the area under cultivation for a given commodity over the past years.
- **Opportunities for value addition:** The commodity should have significant potential for value addition (both primary and secondary processing).

Based on the above selection criteria, the project has identified the following commodities and the corresponding regions:

- Groundnut (Bundelkhand region)
- Black Gram (Bundelkhand region)
- Specialty Rice (Kalanamak) (Siddharthnagar and Gorakhpur districts)
- Potato (Eastern UP and Bundelkhand region)
- Vegetables (Varanasi division)
- Banana (Kushinagar)

The commodities list and the corresponding regions maybe adjusted during the course of the project, as necessary.

The project team and service provider will be engaged in identification of commodities and regions for project intervention.

2A.2 Conducting Commodity-Wise Diagnostics

The commodity-wise diagnostic will be conducted for each of the identified commodities. The diagnostic study will be conducted by a service provider (consultant) and will focus on the following:

- The study must delineate geographies (at the block level – single block or across blocks) of the selected commodities in the identified regions or districts. The study must finalize the criteria for identifying the geographies post discussions with the World Bank and the project team.
- The study must assess the constraints and opportunities for competitiveness of MSMEs /FPOs at each stage of the supply chain in each commodity (and in each geographic cluster, if needed). Additionally, the study must specify the policy, regulatory, infrastructure and other binding constraints and their priority that hamper investment for both existing and new private players. The study must recommend

private sector solutions promoting competitive and inclusive value chains. The study must also analyze the good practices followed in India and globally in the identified commodities and provide recommendations based on them.

- The study must identify and calculate the price mark-up along the supply chain for the identified commodities.
- The study must substantiate the relevance of the identified commodities based on market and productivity trends and environment suitability.

The commodity-wise diagnostic will be conducted primarily in UP. The diagnostic will also be conducted in other states as few commodities are being processed in other states.

2A.3. Preparing Cluster Development Plans

The Cluster Development Plan (CDP) will be prepared by the Cluster Project Implementation Team (CPIT)24 based in each agro-cluster. This will be done through a participative process, by taking inputs from both public and private stakeholders. CDP will provide a detailed implementation plan for cluster development for each cluster selected under the project. The CDP will provide budgeted activities to be implemented for the development of the agro-cluster. The CDP would include the following:

- Identification of beneficiaries (entrepreneurs, farmers and collectives) and area to be covered
- Identification of customized package of practices with relevant technical institutions
- Identification of quality package of inputs (seeds, fertilizers, pesticides etc) and sources
- Identification of areas for in cluster requiring micro irrigation and facilitating convergence
- Identification of mechanization solutions to meet specific needs
- Identification of processing technologies and infrastructure (sorting, grading, pack-houses, processing units etc.)
- Identification of storage requirements and possible locations for development of storage facilities (warehouses / cold storage, food safety practices etc.)
- Identification of market development requirements including export market (market research, buyer-seller meets, consultations, partnerships, logistics analysis etc.)
- Assessment of training needs for the various stakeholders
- Formulation of Environment and Social Safeguard Plans
- Formulation of phase wise workplan including activities, physical facilities to be created, estimated budgets, among others.

Partnerships with institutes of Eminence to support sector specific interventions. The indicative list of proposed institutions is as under:

1. National Research Centre for Groundnut, Junagadh
2. Indian Institute of Vegetable Research, Varanasi
3. Indian Institute of Pulses Research, Kanpur
4. Central Agricultural University, Jhansi
5. IRRI
6. CIPHET
7. NIFTEM, Sonipat, Haryana and CIFTRI, Mysore
8. Indian Institute of Management (IIM), Lucknow
9. NRC Banana, Tamil Nadu

2A.4. Implementation of Cluster Development plans

2A.4.1 Mobilization of Beneficiaries

The mobilization of beneficiaries will be done through:

Awareness Campaigns

Mobilization of beneficiaries including farmers, farmer collectives, and entrepreneurs will be done by organizing various awareness campaigns. The awareness campaigns will utilize various communication tools and strategies, such as pamphlets, documentary movies, posters, and regular village-level meetings, among others.

Awareness will be created among farmers regarding:

- Benefits of a farmer group in addressing issues related to the production and marketing of produce
- Building consensus among the farmers to organize themselves into informal village-level farmer groups (Farmer Producer Groups (FPGs))

In order to encourage participation of entrepreneurs, awareness amongst entrepreneurs will be created regarding the project activities and its objectives.

Identification of Progressive/Lead farmers

Lead/Progressive farmer model involves selecting experienced and knowledgeable farmers who would serve as leaders and mentors for promoting agriculture practices & technologies; and providing value chain support services. A progressive/lead farmer is characterized as a dedicated, full-time farmer who demonstrates technical competence, remains abreast of cutting-edge agricultural innovations, and exhibits prudent decision-making skills.

The selection of lead farmers is particularly crucial, the selection will be based on a comprehensive assessment of the following but not limited to:

- Technical proficiency
- Community influence and involvement

- Level of literacy
- Leadership qualities
- Openness to sharing information
- Willingness to take risk in order to adopt new practices

Lead/progressive farmers will serve two crucial purposes:

- **Extension Services to FPGs**: The Progressive/Lead Farmer Model will be based on the principle of "farmer-to-farmer" extension, where farmers will learn and teach each other. The lead farmers will work closely with other farmers by conducting on-farm demonstrations and organizing field days to provide practical trainings. Lead farmers will provide region-specific guidance to the FPGs on the selected commodities, taking into account local soil conditions, climate patterns, available resources, etc. The land of lead farmers' will be the demonstration sites for best practices on crop management, pest and disease control, soil fertility management, etc.
- **Value Chain Support and Support Services**: Lead farmer could also apply for the grants provided by the project to start or support their existing agribusiness. For instance, lead farmer could apply for grants specifically to start a rental service for mechanised equipment such as tractors, combine harvesters, etc. for famers. Lead farmers in this way can ultimately take on the role of agricultural entrepreneurs.

Creation, formalization and training of FPGs as per business need (governance)

Cluster team will provide support to mobilize farmers into Farmer Producer Groups (FPGs) and formalise the existing FPGs. FPGs will be self-managed, independent group of farmers with a shared goal and interest. One FPG would comprise of 30-35 farmers. The aim would be to create and transform FPGs into entrepreneurial, market-oriented, financially sustainable organizations with the capacity to perform selected value-adding activities and deliver a range of services. The time period required for this activity would be around 12 months.

Training and Capacity Building

The cluster team will provide training to strengthen the capacity of both the existing and newly formed FPGs. Over the course of the project, some of the FPGs could be federated into farmer producer organizations (FPOs) or linked to existing farmer producer organizations (FPOs)/ farmer producer company (FPCs).

2A.4.2 Improving quality and access to seeds

The improvement of quality and access to seeds will take place in selected crop clusters through the following sub-activities:

1. **Seed Production**

- **Linkage with institutes of foundation seeds**

- **Provide foundation seeds to individual and groups:** Foundation seeds would be sourced from the relevant institutions and provided to FPGs/ lead farmers/ seed farms etc. to produce the certified seed. The certified seed of the relevant varieties would be procured by the project and provided to the farmers for market led production. The project through its technical resources will build the capacities of the seed producers for production of certified seed, testing, storage and distribution.

  Where ever feasible, the Cluster Project Implementation Team (CPIT) will work with the District teams (DPIU and Support Agencies) for seed production.

- **Production of seeds by private enterprise (individual/ groups)**
  - **Creation of Community Seed Producer Groups (CSGP):** Creation of CSGP will strengthen the seed supply system by enabling production of locally suitable seeds by the farmers and private sector. The objective is to create self-sustaining CGSPs that will fulfil current unmet seed demand, provide access to seeds in remote areas and effectively produce quality seeds adapted to the diverse agro-ecologies.
  - **Sensitization in the seed production processes**: The sensitization of seed production processes will be conducted among stakeholders about the importance of following best practices in the seed production cycle. This will include creating awareness about high-quality seeds, proper seed handling, storage, and distribution methods, and adherence to regulations and certification procedures.
- **Training for Seed Processing, Testing and Storage**: The project will provide required training and technical backstopping for seed processing, testing and storage. The project will specifically conduct training for farmers on seed production, seed certification or application of truthful labelling, post-harvest management of seed including germination tests, seed processing and cleaning, effective seed storage practices.

2. Seed Distribution

- **Sourcing of quality seeds of desired varieties from public and private seed suppliers:** Good quality seeds for the required variety will be sourced from both public (such as government seed banks) and private seed suppliers. Supply of the quality seeds in crop clusters will be done by the cluster team in partnership with technical institutions, seed corporations and state agricultural universities. The project will directly procure and supply the seeds to the farmers.

2A.4.3 Crop management practices

The project will aim to improve crop management practices at the cluster level based on commodity- and field-specific recommendations. The improvement in crop management practices for crop clusters will be done by the cluster team, technical partners (including agri-

tech start-ups, buyers) and State Agricultural Universities (SAUs) and will include the following:

- **Developing customized package of practice:** Customized Package of Practices (POP) will be designed and developed in collaboration with the relevant technical partner for specific commodity and region. The customised POP for a particular crop will include good agricultural practices (GAP).
- **Assessment of Maximum Residue Level (MRL):** Assessment of existing MRL and microbial load will be done in collaboration with accredited State labs, to determine the current levels of residue. Based on the results of MRL assessment, POP will be updated, which will aim to sensitize farmers on optimal level of reside and how to reduce these levels in the long-term.
- **Demonstration plots:** Demonstrations will be organised relating to various agricultural practices (such as integrated crop management technology including improved seed, recommended fertilizer dose, irrigation/rainwater management, weed control and pest management). The demonstration will take place on farms of lead farmers and technical partners fully funded by the project as a project expense.
- **Training and field exposure:** Cluster team and/or technical partner will organize training for lead farmers/adopter farmers at site for adoption of POP. In addition to training, exposure visits outside cluster to reputed organizations, farmers' fields, research stations etc. will also be organised for further strengthening of skills.
- **Follow-up activities:** Field progress for each cluster will be monitored by the cluster team and will include assessing the level of adoption of POP and other skills and knowledge enhanced through trainings; and impact of trainings measured in terms of productivity and quality enhancement. Based on their findings, corrective action will be taken wherever required.

The project will directly procure and supply the crop production and management inputs like fertilizers and plant protection to the farmers.

2a.4.4 farm Mechanisation and IT enabled Services

Mechanisation and IT enabled services at the cluster level will be promoted for enhancement of productivity and production of crops. This is particularly necessary in the context of crop intensification, diversification and labour shortage. The use of these services will be promoted by the cluster teams, relevant government departments and private players (including agri-techs). Mechanisation and IT enabled services will be promoted in the following way:

- **Developing appropriate services:** Appropriate mechanized farming solutions and IT enabled services will be developed/evolved by collaboration with the relevant technical partner.

- **Demonstration plots:** Demonstrations will be organised for promoting the use of mechanisation and IT enabled services for each cluster. These demonstrations would be conducted at suitable farm sites and be fully funded by the project as project expense.
- **Training and field exposure:** Cluster team and/or technical partner will organize trainings for lead farmers/adopter farmers for adoption mechanized farming solutions and IT enabled services wherever available. In addition to training, exposure visits outside cluster to reputed organizations, research stations etc. will also be organised for further strengthening of skills.
- **Follow-up activities:** Field progress for each cluster will be assessed by the cluster team. This will include assessing economics of the intervention and the impact of trainings measured in terms of productivity and quality enhancement. Based on the assessment, corrective action will be taken wherever required.
- **Custom Hiring Centres (CHCs):** The custom hiring centres (CHCs) will be dovetailed with the CHC set up under Component 1. Wherever needed, machinery required to address the needs of commodities grown under Component 2 will be provided at these CHCs through additional grant to the concerned FPCs.

2a.4.5 Storage

The objective of this activity is to provide project beneficiaries in crop clusters with high quality storage. This will be done through the following:

- **Assessment of the current storage needs**: The storage facilities will be assessed and upgraded in the selected agro-cluster area by the cluster team, Agri-finance expert (CPIT), and private players (including collectives, individuals, companies). The assessment will gauge the interest of prospective investors (private entrepreneurs) in storage development, the assessment should include:
    - Map and assess the state of existing storage facilities (including cold storage) and storage fees. The assessment should identify and evaluate existing and additional innovative on-farm storage solutions.
    - Identify suitable sites for creation of storage infrastructure
- **Environment and social assessment**: An environment and social assessment of the proposed storage facilities will be conducted by evaluating their potential impact on the surrounding ecosystem and local communities. It will involve identification of key environmental and social issues arising out of the setting up the storage facilities. The assessment will present measures for ensuring adherence to environment and social standards.
- **Assist in introduction and compliance of food safety norms:** The cluster team will provide support to storage provider and users on compliance with food safety

regulations during storage. This will specifically include sensitizing on FSSAI and HACCP standards required for storage.[25]

- **Supporting prospective investors:** The cluster team will provide hand holding to prospective investors and facilitate the investors in processes required for setting up the infrastructure. This will include also include providing support for accreditation and registration of storage facilities and warehouses; and facilitating linkage between commercial banks and prospective investors as well as finance incentives from the project (e.g. grants).

The project will issue a call for proposals for inviting private entities (agribusinesses, farmer collectives, new entrepreneurs, etc.) to set up storage facilities on their own land. The project proposals will be vetted by a team of experts and the selected entity will be provided 40% of the total project cost (milestone-based payments) as a grant. The cluster will team will provide hand holding to prospective investors and facilitate the processes required for setting up the infrastructure.

2a.4.6 Processing facilities

The cluster team in association with private players (including collectives, individuals and companies) will be supporting the development of the processing sector in the following way:

- **Assessment of processing needs:** An assessment of processing requirements will be conducted for the crop clusters. This will include evaluating the interest of prospective investors (private entrepreneurs) and specifically an analysis of:
    - **Processing needs:** The processing machinery and technology required for the specific commodity along with the machinery specifications and cost.
    - **Potential processing sites**: Identify area for setting up the processing facility, the potential site should have access to transport, water and power. To ensure sustainability and viability of business operations, focus will be given on economies of scale.
- **Environment and social assessment**: Environment and social assessment will be conducted to gauge the potential impact of the proposed processing enterprises on the surrounding ecosystem and local communities. It will involve identification of key environmental and social issues arising out of the setting up the processing facility. The assessment will present measures for ensuring adherence to environment and social standards.
- **Assist in introduction and compliance of food safety norms:** The cluster team will provide support to the processing facilities to comply with food safety regulations

[25] **FSSAI (Food Safety and Standards Authority of India) Registration:** In India, anyone (individual or a business entity) involved in the food business, which includes activities like manufacturing, processing, storage, distribution, and sale of food products, is required by law to obtain FSSAI Registration or License.
Hazard analysis and critical control points (HACCP): HACCP is designed for use in all segments of the food industry from growing, harvesting, storage, processing, manufacturing, distributing, and merchandising to preparing food for consumption.

and obtain various certifications on food safety (FSSAI and HACCP standards). The cluster team will conduct training on good hygiene practices, good manufacturing practices, process for food safety certification, and requirements for food safety certification.

The project will issue a call for proposals for inviting private entities (agribusinesses, farmer collectives, new entrepreneurs, etc.) to set up storage facilities on their own land. The project proposals will be vetted by a team of experts and the selected entity will be provided suitable incentives. The cluster team will provide hand holding to prospective investors and facilitate the processes required for setting up the infrastructure.

2a.4.7 Market Development

Market development will be undertaken by the project through a market study which would span from cluster level to major markets in the state, national and global level. The market development will be taken up by technical partners and the cluster teams through:

- **Market assessment study:** After identification of major market and aggregation points, market assessment studies will be done for domestic and international markets at different levels of the value chain This will include identifying high-potential markets, new products, demand assessment, price trends, cost and profit analysis, among other factors.
- **Marketing and branding:** The project will support marketing and branding activities for selected commodities. The support will be provided specifically on market requirements, positioning of the product, quality standardisation, packaging, labelling and branding.
- **Engagement with stakeholders:** The project will engage with prospective market players to participate in the business activities related to the commodity through B2B marketplaces, product expos etc. Specifically, a buy-seller meeting could be organized among cluster's food processing companies and traders and market players. The meeting should serve as an effective platform for traders to understand the procurement needs of these market players.
- **Facilitating linkages:** Facilitate linkages between producers of raw material, buyers/aggregators, processors, organized retailers and exporters among others, through vertical and horizontal integration.

2a.4.8 Capacity building

Capacity building support will be provided to farmers, collectives (FGPs) and enterprises by the cluster team in collaboration with technical and training partners. The team will identify skills gaps and will collaborate with different technical and training partners for capacity building. The process to provide capacity building will include the following:

- **Training needs assessment:** An assessment of the existing capabilities of the stakeholders (farmers, collectives and enterprises) will be conducted for carrying out the proposed project activities. The assessment will identify the gaps in skills. Based on the training needs assessment, the cluster team in association with technical and training partners will develop a capacity building plan for addressing the skill gap.
- **Identification of technical assistance:** Training partners will be identified by the cluster team for harnessing the necessary skills. The technical and training partners identified will be engaged in delivering customized training based on training needs assessment.
- **Formulation of a plan for delivery:** Cluster team along with the training partners devise a plan for delivering trainings. Adult learning training methodology will be used for training that will require active participation of the trainees and it will be practical and hands-on wherever possible.
- **Preparation of training modules:** Training will be facilitated through lectures, PowerPoint presentations, video shows, group discussions, reading materials, etc. Based on the training plan, detailed training modules will be prepared covering various aspects of training (such as good agricultural practices, crop management, farm mechanization, agri-processing, post-harvest management, good storage practices for crops, market driven extension, agricultural marketing channels, etc). To make the training courses effective, participants will be provided with training modules/ manuals.
- **International Exposure:** the project will aim to send 500 farmers to different Countries on exposure visit to best practices.

2a.4.9 Food Safety

It is imperative that for positioning premium products in the market, critical factors such as product safety and quality are considered. Both these issues have to be addressed from the cultivation stage through use of judicious practices and inputs and thereafter the same principles have to be followed during the course of storage, transportation, processing and packaging. In order to achieve the desired standards, the following actions would have to be taken:

- **Undertake assessment of the residue levels** of chosen products in the clusters to understand the current situation for initiating steps to meet the different market requirements of the buyers and dovetail production processes accordingly.
- **Preparing the negative list of inputs and processes**: The negative list of inputs and processes will be developed for each cluster by the cluster team that will specify the inputs and practices that must be avoided. This list will be made available to all and will help the project beneficiaries to comply with the food safety standards.
- **Relevant food safety standards**: A survey of food safety practices and awareness and will be undertaken to understand the gaps in the current food safety standards.

Relevant food safety standards and norms as applicable at different stages of production, handling, transport and processing will be introduced.

- **Framing Standard Operating Procedures (SOPs)**: Based on a capacity assessment of selected laboratories in the State, SOPs will be developed that would assist laboratories to perform the required food safety tests. SOPs will be formulated for periodic sampling and testing of both raw material and finished products at an accredited laboratory to detect MRLs, harmful micro-organisms, unacceptable physical parameters etc. SOPs will ensure the testing process is done periodically according to developed guidelines.
- **Issue of appropriate certificates as desired by the buyer**: The buyers may request a list of relevant regulatory certifications, which will be made available.

In case during the course of the project, it is felt necessary to do a pilot on traceability, the same can be undertaken within the relevant clusters.

Implementation Model

The Cluster Planning and Implementation Team (CPIT) will be formed for each agro-cluster. It will be led by a cluster manager and will comprise of the following experts on (as shown in figure 2):

- **Production:** The production expert will be responsible for planning and managing the production activities of the cluster for the selected commodities. The expert will collaborate with FPGs to provide support for project activities such as mechanisation and crop management which are aimed to increase production capacity of the cluster.
- **Finance:** The finance expert will provide support to the clusters in financial management. The expert will participate in regular audits under the project and recommend corrective financial solutions where required. There will be one Finance Expert per Commodity.
- **Marketing:** The marketing expert will be responsible for providing support related to marketing and branding activities of the cluster. The expert will also assist in identifying the market trends and demand of processed products of the FPG. There will be one Finance Expert per Commodity.

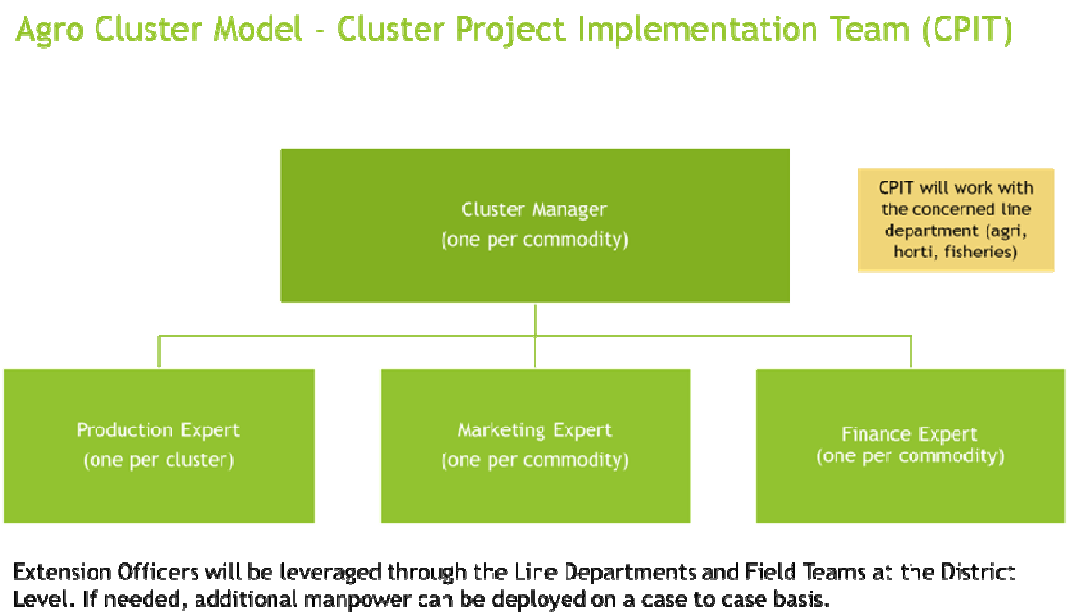


Figure 23: Agro cluster - Cluster Project Implementation Team (CPIT)

Each CPIT will work will approximately 2000 farmers. The CPIT will also leverage resources from the District teams at the District Project Implementation Unit (DPIU) including training coordinators, technical assistants at the NP level and block level motivators.

Implementation Timeline

Table 36: Agro-Clusters Implementation Timeline

S. No.	How will the component be implemented	Yr 0	Year 1				Year 2				Year 3				Year 4				Year 5				Year 6			
1	**Identification of Commodities and regions**																									
2	**Conducting commodity-wise diagnostics**																									
3	**Cluster development plans**																									
3.1	Recruitment of CPIT																									
3.2	Preparing of Cluster development plans																									
4	**Implementation of Cluster Development plans**																									
4.1	Mobilization of Beneficiaries																									
4.2	Improving quality and access to seeds																									
4.3	Crop management practices																									
4.4	Mechanization																									
4.5	Storage																									
4.5.1	Sectoral Assessment																									
4.5.2	Infrastructure Roll-out																									
4.6	Processing facilities																									
4.6.1	Sectoral Assessment																									
4.6.1	Infrastructure Roll-out																									
4.7	Market development																									
	Market Assessment																									
	Business Linkages and Transactions																									
4.8	Capacity building																									
4.9	Food Safety																									
4.9.1	Assessment																									
4.9.2	Food Safety Processes																									

Key Outputs

Outcomes: For selected high-value commodities:

- Establishing / improving supply of high-quality, market-oriented produce of small-scale producers
- Establishing robust value chains to efficiently link small-scale producers to markets
- Increased value addition through increased investment in processing and post-harvest activities
- Higher incomes for small-scale producers
- Demonstration of successful clusters for subsequent replication

Sub-Component 2B: Fisheries Clusters

Background

The state of Uttar Pradesh has vast and varied inland fisheries and aquaculture resources which are at various levels of utilization. Fisheries resources are mainly in the form of network of rivers and rivulets, community ponds, reservoirs, network of irrigation canals and extensive floodplain wetland. Aquaculture has huge potential for development through both expansion and intensification. Fisheries sector provides sizable rural livelihoods especially to those who need most – the disadvantaged traditional fishers, farmers and other resource-scarce landless rural communities. Livelihood opportunities is made available through a range of activities such as fishing in open waters; farming of fish in ponds; seed production activities such as hatchery operations, seed rearing and transport of seed; and other ancillary activities. Fishing being largely a seasonal activity, a sizable number of fishers migrate and interphase between rivers and reservoirs, lakes to ponds for fishing and also go elsewhere to get other jobs.

In Uttar Pradesh, the per capita annual income in Eastern UP and Bundelkhand is below the national level and also below the rest of UP. Despite the availability of abundant water resources, the average productivity of aqua products is poor compelling the fishers to live a substandard life.

Aquaculture is one of the fast-emerging rural economic activities and is termed as a growth engine of rural agribusiness. Uttar Pradesh is well placed for growth in this sector after the launch of of the Blue Revolution and Pradhan Mantri Matsya Sampada Yojana (PMMSY) in the state which led to the production of 7.46 lakh metric tons (against the total national inland fish production of 121.21 lakh metric tons in 2020-21 and rose to 9.13 lakh metric tons in the year 2022-23.

Current domestic fish demand of Uttar Pradesh, is estimated to 14.59 lakh tones whereas the State fish production is only 9.13 lakh tones (2022-23). With the demand for fish continuously rising with an increase in the fish-eating population, Uttar Pradesh is dependent on other fish producing states for fish despite having enormous water resources with huge fishery potential. However, these resources either remained unutilized or underutilized due to the following reasons:

1. Aquaculture is the key fish production activity in UP which is mostly being explored in the form of extensive fish culture (horizontal expansion), a very old age practice that does not proportionately respond to expected fish production and productivity. Only 40% of aquaculture resources are covered under fisheries while a major share of available

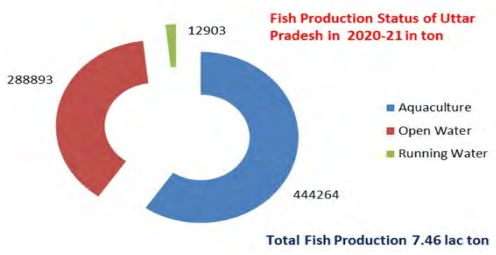


Figure 24: UP Fish Production (2020-21)

fisheries resources remains unutilized. Approximately 5.66 lakh ha in form of Reservoirs (1.57 lakh ha), lakes (1.33 lakh ha), oxbow lakes (0.51 lakh Ha), water logged area (1.64 lakh ha), and riverine wetlands (0.61 lakh ha) are either underutilized or unutilized.

2. Proven fisheries technology of semi-intensive and intensive fish culture systems (vertical expansion) exist in a rudimentary state with a low adoption rate when its multiplication is essential to enable fish farmers to contribute substantially to augment fish production. However, majority of fish farmers are unable to adopt these technologies without the support of subsidies/grants, leading to underutilization of fisheries resources for fish production.

3. Use of poor quality of fish germ plasm affect the fish growth (as a result of inbreeding), insufficient availability of high crop fish varieties because of a lack of their hatcheries in UP (pangasius, Jayanti Rohu, Gift tilapia, scampi etc.) due to technical reasons and low use of formulated fish feed in aqua practice (mostly dependent for food intake on natural food) and poor fisheries management are the main reasons behind low fish productivity of UP.

The uptake percentage of prevailing Government Schemes is low despite a large number of aspirant fishers keen to adopt aqua culture.

These challenges can be mitigated by enhancing production and productivity of fisheries using a commodity cluster approach and providing easy market accessibility to the fisher communities. To bring untapped water resources under the domain of aqua culture, the gaps will be narrowed down through the interventions of UPAGREES; thereby making the districts of the project self-sufficient in fish production and improving the living standards of all stake holders.

The fisheries sector in Uttar Pradesh holds considerable potential to increase economic returns from the use of water due to the large number of reservoirs, village ponds and tanks in the state. Given the close linkage of the blue economy with numerous sectors, the impact of any new changes in the sector will lead to significant economic, social and environmental benefits. Moreover, promotion of the blue economy can also help in mitigating climate change impacts.

To tap into this high potential, modern scientific approaches and improved production models for reservoirs and village ponds are essential. The appropriate method has to be a phased development of fisheries in these water areas in a way that will enable to gradually build adequate supporting infrastructure, skilled human resources, and auxiliary industries.

This sub-component will work with reservoir fishers, fish farmers, fish processors, and fish traders. Specifically, the project will finance:

(i) Cluster Development Plans (CDP) based on diagnostic to determine the fish market demand and suitable locations for postharvest management infrastructure (such as cold

storage, ice plants, fish processing units, fish kiosks). CDP will promote mitigation benefits through adoption of energy-efficient practices and development of strategies to minimize waste generation within the cluster.

(ii) Quality fish seed by modernizing hatcheries and pure line breeding program for improved germplasm; fish seed nursery enterprises in the private-public mode; and quality fish feed by using locally available ingredients. Utilization of sustainable feeds will lead to reduced emissions in fish production.

(iii) Fisheries management system in reservoirs based on assessment of water bodies. The system will foster habitat conservation that not only maintains ecosystem health but also prevent the release of stored carbon in these environments.

(iv) Innovative and climate resilient aquaculture technologies for sustained fish production in farm ponds.

(v) Integrated aquaculture hub and eco-park through enterprise development. These activities will implement energy efficiency in fisheries value chain resulting in substantial emission reduction. The activities will also demonstrate sustainable water management, conservation of native fauna and flora, and environmentally friendly way of fishing and aquaculture.

(vi) Post-harvest and energy-efficient marketing infrastructure including landing centres, fish processing units, and linking with existing online fish marketing platforms. The project will promote food safety to encourage fish marketing and provide training on product safety procedures to fishers, transporters, processors, handlers, wholesalers, and retailers.

(vii) Modernization of State Fisheries Training Centre into a state-of-the-art facility for training staff, fishers, and farmers.

Objectives

- To enhance the Fish productivity in farm ponds as wells as reservoirs and improve farmer/fisher's access to market through cluster approach.
- Transforming rural poverty to prosperity through ecofriendly commodity cluster based fisheries and aquaculture development in community ponds and reservoirs.

Guiding Principles

The Key Principles Underlying the Project Intervention Design and Approach

a) **Active farmer participation** in planning, implementing, and evaluating project interventions will enhance the relevance of varieties/species selected for fish production/ farming, increase adoption of new technologies and good farming practices, and contribute to the sustainability of both technical interventions and the local institutions supporting farmers.

b) Project interventions should meet **high standards of technical quality** as well as social, environmental, and fiduciary considerations.

c) Investment in **group and community-level institutions**, **capacities and productive assets** provides a strong and sustainable basis for livelihoods enhancement by allowing beneficiaries to collectively learn more, achieve scale and better transactions terms and organize more effectively to benefit from investments made through the project.

d) Project activities formulated will focus on **sustainability** (environmentally, socially, and economically compatible) and **quality** (improved traceability for compliance) of the fish production and management system.

e) Project interventions were formulated considering the **State Vision document** and **National Blue economy** initiatives.

The project is designed for the effective transfer, adoption and diffusion of the potential/available on-farm technologies specific to diverse production environments, complemented by investments to improve efficiency in the use of natural resources. Below are the specific activities that will be taken up in the project:

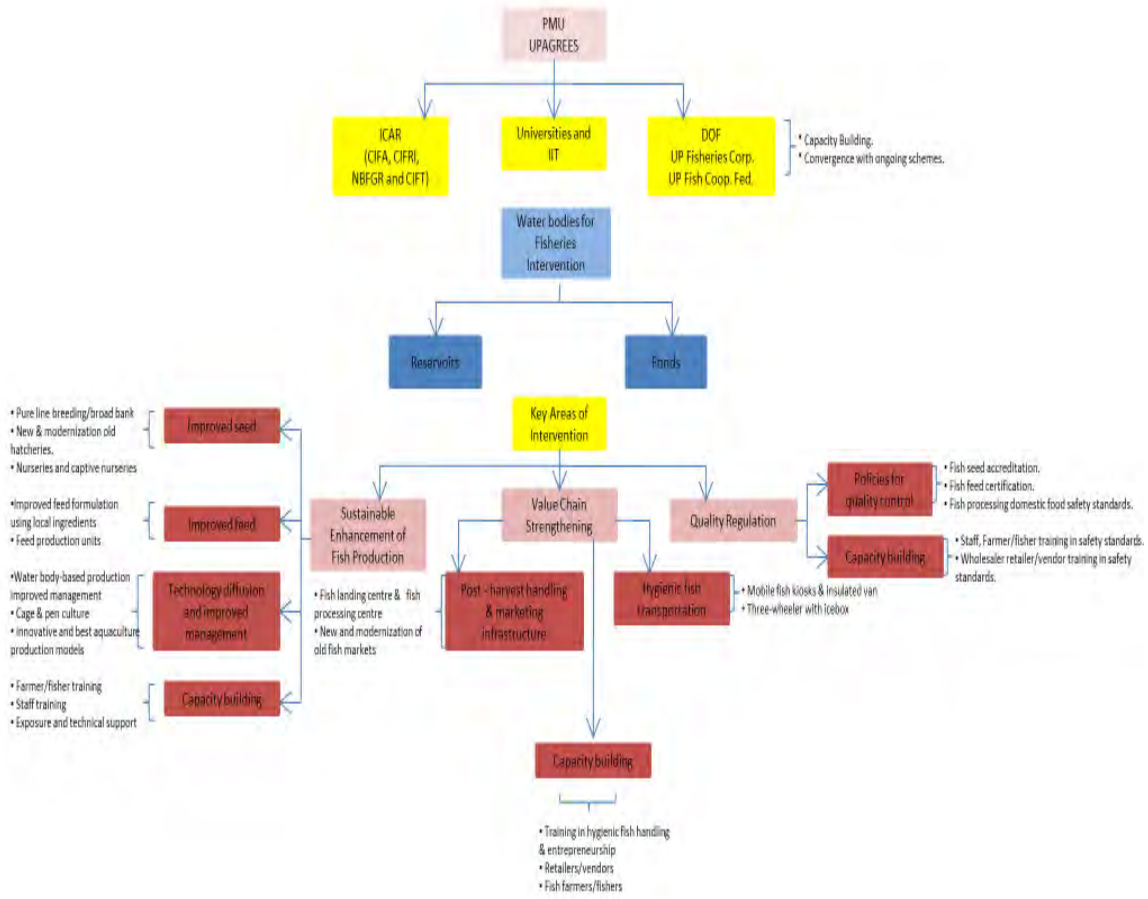


Figure 25: Fisheries Intervention Framework

Activities related to aquaculture in community/ private ponds and integrated reservoir fisheries will be implemented with coordinated efforts of DoF UP, UP Fisheries Development

Corporation and UP fisheries cooperative federation and the irrigation department. External partner agencies (ICAR/Universities/IIT/other reputed national and international organizations) will disseminate advanced aquaculture technology and support the capacity building of human resources for better outcomes.

2B.1. Identification of Clusters for Project Intervention and development of Cluster Development Plans

Four major fish cluster-based areas have been proposed for the project intervention.

Gorakhpur fish cluster includes Gorakhpur, Basti and Azamgarh Division and consisted of 10 districts namely Gorakhpur, Maharajganj, Deoria, Kushinagar, Ballia, Mau, Azamgarh, Basti, Siddharthnagar and Sant Kabirnagar where farmers mainly practicing pond fish culture, fish seed nursery, rearing farmers and a considerable number of fish hatchery owners and seed growers.

Varanasi fish cluster includes Varanasi and Vindhyachal divisions with diverse topography where fishers mainly dependent on pond aquaculture while in district Mirzapur, Sonbhadra and Naugarh area of district Chandauli also have good number of reservoirs where community- based reservoir fisheries activities also take place.

Devipatan Cluster includes 4 districts of Devipatan division comprising of Gonda, Balrampur, Sravasti and Bahraich mostly sharing borders with Nepal having diverse water resources like flood plains, wetlands, oxbow lakes, Ramsar sites and ponds. Aquaculture, culture-based capture fisheries and capture fisheries are common practices. This region offers bright scope for setting up of Fish Production Hub cum Eco Park besides regular fisheries activities.

Bundelkhand fish cluster has a mixed nature of fish farming practices where aquaculture activities are seen in perennial or semi perennial water bodies but predominated with reservoir fisheries activities and includes Mahoba, Banda, Chitrakoot, Hamirpur, Jhansi and Lalitpur whereas in districts Jalaun only aquaculture is done by fish farmers.

Development of Cluster Development Plans (CDP)

The Cluster Development Plans (CDP) will be prepared in the project with help of suitable support organisation and in case of reservoir fish clusters the task for the formation of CDP will be done under the direction and supervision of District Project Managers. Data will be compiled and reconciled of available water bodies at the block level though various resources (from Revenue Dept, State DoF and GIS mapping), from comprehensive field survey and ground truthing to assess and map the feasible number of FPGs. They will also be assisted by local motivators/ NGOs/TSA. The CDP will provide a detailed implementation plan along with the budget for all activities for the development of each cluster selected under the project.

The CDP would include the following:

- Collection of data and relevant information of all available community and private ponds of more than 0.2 ha in size, their numbers with area in hectare from all 28 districts of the project area, current use for aquaculture along-with average production and fish productivity. In case of community ponds, only those with more than 05 years of remaining lease period will be undertaken. Information pertaining to lease holders, fish species being cultured in that particular area and their market price, local fish consumption/ quantum of fish being exported from that area, availability of local markets and available supply chain will also be collected.
- Data pertaining to cluster based reservoir management in terms of total water spread area, average available perennial water volume and its coverage area, suitable site selection keeping in mind pollution free sites and depth of water for technical suitability for installation of cages and pens, variety of species predominant in reservoirs and their volume of catch, socio economic status of people residing nearby, requirement of cages and pens, landing centres, approach roads, solar lighting, postharvest management etc will be assessed by comprehensive field survey which will be executed by Fisheries Extension Workers under the close observation and monitoring of Deputy Cluster Manager – Reservoir Fisheries (1/division) to assess the feasible number of formations for fisheries clusters. Cross verification of available data will also be done with ground truthing.
- CDPs will be developed through a participative process, by taking inputs from both public and private stakeholders and will provide a detailed implementation plan for cluster development of each selected cluster including identification of beneficiaries (entrepreneurs, farmers and collectives) and area to be covered under each cluster.
- Data collection for available seed procurement resources like fish hatcheries, nurseries, suitable water potential for captive nurseries and feed mills etc.
- Identification of customized package of practices with relevant technical institutions (ICAR/ NACA)
- Identification of quality package of inputs (seeds, feed, fertilizers, probiotics etc). under the project.
- Assessment of training needs of various stakeholders
- Formulation of Environmental and Social Safeguard Plans
- Formulation of phase wise workplan including activities, physical facilities to be created, estimated budgets, among others.
- Identification of Lead Farmers of cluster area. Lead/progressive fish farmers will serve the clusters for the following purposes:
    - *Extension Services to FPGs*: The Progressive/Lead fish Farmer Model will be based on the principle of "farmer-to-farmer" extension, where farmers will learn and teach each other. The lead farmers will work closely with other farmers by conducting on-farm demonstrations and organizing field days to

provide practical trainings. Lead farmers will provide region-specific guidance to the FPGs on fisheries commodities, taking into account local climatic conditions, able to explore available resources for extension and capacity building of base line fish farmers, etc. The land of lead farmers' will be the demonstration sites for best practices on aquaculture and post-harvest management, fish disease control, pond fertility management, etc.

- *Value Chain Support and Support Services*: Lead farmers will be supported with grants through the project to develop fish demonstration sites and support base farmers for their skill development as master trainers. Based on their experience and expertise lead farmers will be inducted to take on the role of fisheries entrepreneurs in the field of supply chain of critical inputs and to create post-harvest facilities for multiplication of fisheries activity and maximize fish production.

- **Partnerships with institutes of Eminence to support sector specific interventions.**

  The indicative list of proposed institutions is as under:

  - National Bureau of Fish Genetic Resources (NBFGR)
  - Central Institute of Freshwater Aquaculture (CIFA)
  - Central Inland Fisheries Research Institute (CIFRI)
  - Central Institute of Fisheries Technology (CIFT)
  - National Fisheries Development Board (NFDB)
  - Acharya Narendradeo Agriculture University, Ayodhya
  - Rani Laxmibai Central Agriculture University, Jhansi.

Formation/ Identification of Fisher Producer Groups (FPGs)

Targeted water bodies within the project area

The execution of project interventions will primarily consider fisher producer groups (FPGs) as the entry point consisting of farmers (ponds), fishers (reservoir and lakes) and value chain actors including fish seed and feed producers, processors, and fish traders. The project will work with existing FPGs where available and assist in the formation of them where needed.

Methodology for Commodity Cluster based aquaculture and fisheries promotion in community Ponds and reservoirs

Enhancement of fish production in community Ponds and reservoirs in Eastern UP and Bundelkhand region will be ensured through formation of commodity clusters: Fish Producer Groups (FPGs) using the following methodology:

Assessment of Potential Sites: A comprehensive field survey will be conducted to identify suitable clusters of village ponds for aquaculture and prospective reservoirs. It will include evaluation of water quality, depth, access to sunlight and proximity to markets.

Formation of Fisher Producer Groups (FPGs): A base line survey will be carried out to identify fishers for the formation of Fisheries Producer Groups (FPGs) for aquaculture in identified blocks by the block level Technical Assistants. The FPGs supported by the project will be assisted by Support Organization (SA) teams. Each FPG will be consisted of at least 20 active fish farmers who are practicing fish culture in community ponds.

The following specific activities will be carried out:

- Meetings will be organized with local farmers to discuss the benefits of forming FPGs.
- Guidance will be provided to them on the basic legal framework, registration process and operational aspects of FPGs.
- Support they will be given in the establishment of FPGs to promote collective marketing, resource sharing and access to project assistance.

General criteria for selection and formation of FPGs are as follows:

- Water bodies not less than 0.2 ha of water area will only be covered under the project.
- Preference will be given to those clusters where ponds are available in abundance and well connected with approach/ link roads.
- Member of FPG must be a lease holder of community pond with not less than 05 years of remaining lease period at the time of selection or possesses individual pond.
- Persons availed of similar benefit earlier under any other scheme will be excluded.
- FPG member should be actively engaged in fisheries and aqua culture, sensible and cooperative in nature and bears moral characters having no any previous criminal involvement.
- He / she should not be a defaulter of any bank loan.
- 20% of total strength of the FPGs will be women wherever possible.

Exclusive all women FPGs will also be formed where ever feasible. These women FPGs can be given the task of fish seed rearing, ornamental fish production, its' sales and procurement, post-harvest operations like grading, handling fish marketing and value addition besides other ancillary activities like production of fish gears like nets and hapa etc.

A total 1700 FPGs of fishers will be formed during the first three years of the project period, of that 1400 FPGs will be dedicated for Aqua culture while 300 FIGs will be engaged in Reservoir Fisheries. It is proposed to earmark Mobilization Funds @Rs 0.50 Lakh towards activities of each FIG which will cost to the tune of Rs 850 Lakhs in project. These funds are proposed to be used for various activities related to capacity building, organize meetings, develop business plans, soil and water analysis kits to know the medium health (physical, chemical and biological properties of water) and fertility of ponds and after the project assistance they will be provided KCC for sustainable business operations.

Proposed Yearwise physical targets for formation of FPGs are given as under:

Table 37: Year-wise Targets for Formation of Fisher Producer Groups (FPGs)

FPG category-based implementation	YEAR 1	YEAR 2	YEAR 3	Total
Community based FPGs	250	600	550	1400
Reservoir Based FPGs	50	100	150	300
Mobilization funds Required @Rs0.50 lakh/FPO	150	350	350	Rs. 850 lakhs

Though these clusters would be informal groups of fish farmers who have no legal sanctity the project will ensure that the internal arrangements are at par with the guidelines of FPGs in order to maintain conducive environment, discipline and transparency to work in togetherness to enhance fish productivity and bolstering farmers income by reducing input cost.

Mobilization, sensitization of FPGs with regular follow ups and hand holding along with capacity building will be ensured. A group leader who will have a minimum qualification of intermediate will be unanimously selected within the groups with mutual understanding to carry out the smooth function of the FPG, maintain records and convene general body meetings from time to time. Lead fish farmers residing in the area will be approached to be inducted as a member of the FPGs. He will share his expertise with farmers and help them to augment fish production by rendering onsite training and hands on demonstrations.

Need based requirement of input in form of Fish seed and feed will be provided as goods to the members of FPGs, procured by the project. The lead and progressive farmers will be trained by the external knowledge partner agencies/Agriculture universities in seed and feed formulation, pen and cage farming as Training of Trainers (ToTs) who in turn will train base line fish farmers.

In case of Integrated Reservoir Fisheries Management, landless fish farmers/ fishers/ fish labours residing around reservoir areas will be inducted to form FPGs and they will maintain captive nurseries (pen and cages) to raise fingerlings through in-situ rearing. Required infrastructures, formulated feed and implements will be installed by procurement from PMU while fish fry will be procured locally by DPIUs. This will be 100% supported by the project in the form of goods and materials (cage, pen, nets, crafts and gears, related appliances and equipment).

Soil and Water Health Analysis of Ponds

Fish is the bioindicator of water health. It does not consume water but rather works as a scavenger in ponds as it feeds upon suspended particulates, rotifers, protozoans, and microorganisms and maintains the ponds' ecosystems. Fish live on zooplankton and phytoplankton, which are the natural food of fish, and their presence in a pond determines the fertility of the pond. There are certain fixed parameters that determine the cleanliness of the water body, and upon any disturbances, fish negatively react and raise alarms about the purity of the water. There are some important aspects that are the guiding force of

successful aquaculture operations and can be taken into account prior to venturing into the aquaculture profession, which include the physical, chemical, and biological parameters of a pond. To unlock the fishery potential of a water body, it is essential to measure its water quality index and other relevant parameters. Some important parameters of water that determine the suitability of a pond for aquaculture are given below in the table:

Table 38: Optimum Quality Parameters for an Aquaculture Pond

Parameter	Suitable Range	Parameter	Suitable Range
Temperature	27-32°C	Alkalinity	80-120ppm
Salinity	<5ppt	TNA	<0.01ppm
Transparency	25-30cm	NH_4N	0.08-0.2ppm
pH	7.5-8.5	NO_3N	0.04-0.08ppm
DO	>5ppm	P_2O5	0.04-0.1ppm

The soil and water analysis of aqua ponds is not a common practice in Uttar Pradesh, which is the most essential guiding force in enhancing quality fish production and productivity. Without knowing about the ecosystem of the pond and its biochemical deficiencies, it is not possible to transform subsistence fisheries into commercial fisheries. Preparation of the pond, eradication of excessive aquatic weeds and predatory and weed fish, rectification of pH, and accordingly manuring are pre-requisite qualifications for standard aquaculture.

Considering the growing importance of water and soil quality analysis, it is proposed that chemical analysis of water and soil samples be done from 25 thousand aqua ponds situated within the strategic project areas. Clinically tested reports will be provided along with the required advice and handholding. The soil and water analysis records of the sampled ponds will be digitally maintained along with the geo-tagged photos for the maintenance of data and records.

A consulting agency will be hired for this entire activity. The agency will provide district-wise sample reports that will be further randomized and verified by a third-party evaluation.

Table 39: Tentative Estimated Cost for Pond Soil and Water Analysis

Soil and Water analysis of 25000 Aqua ponds			
Year	**Unit Cost in Rs**	**No. of Samples**	**Cost of analysis in Rs**
2025	150	2000	300000
2026	150	5000	750000
2027	150	8000	1200000
2028	150	8000	1200000
2029	150	2000	300000
	Total	**25000**	**3750000**

2B.2 Sustainable Enhancement of Reservoir Fish Production

Reservoirs are an important inland fisheries resource in Uttar Pradesh and these inland aquatic assets must be managed appropriately to enhance productivity in a sustainable manner. These waterbodies are a very diverse resource, and strategies to enhance fish production differ significantly. The reservoir productivity is influenced by climatic, morphometric, and hydro edaphic features. The geographic location alters reservoir productivity, nutritional supply, and basin characteristics. Among climate variables, temperature, rainfall, and wind can change the productivity of water bodies.

Each reservoir has a carrying capacity depending on its nutrient status and morphological characteristics. For a stocking program to be effective and efficient, the carrying capacity of the resource must be known, otherwise, the water body may be overstocked or understocked and productivity may decrease, with detrimental effects on the naturally occurring fauna. While considering reservoirs for culture-based fisheries, their existing fish production, species spectrum and fish production potential are to be considered. The rate of stocking should depend on the fish yield potential, which in turn relies on factors like depth, surface area, primary productivity, climatic and edaphic factors. The modern fisheries management tool is to first assess the carrying capacity and nature of the ecosystem and then develop a production model based on the specific difference or uniqueness of the water body. Therefore, Ecosystem Based Fisheries Management (EBFM) needs to be followed for the sustainable enhancement of fish production. The following important parameters need to be determined for sustainable management:

- Determine stocking density based on production potential along with growth rate and mortality rates.
- Decide appropriate stocking and harvest schedule, allowing maximum grow out time, considering the critical water levels and inflow-outflow regime.
- Select fish species that can utilise the fish food resources in the reservoir.
- Determine stocking density based on production potential along with growth rate and mortality rates.
- Determine aquaculture potential in the form of cage culture, pen culture.

Professionally managed reservoir fisheries are a successful commercial enterprise which could provide rich dividend to the dependent communities. Modern interventions envisaged can be classified into three main parts including technical, administrative, and social/cultural aspects.

Reservoirs are usually called "sleeping giants" because their potential is untapped. Inland fisheries resources in the form of reservoirs are mostly located in the seven districts of Bundelkhand region & Vindhyachal division (1.40 lac hectare). 37 reservoirs of different categories are situated in these districts as follows: Sonbhadra-04, Mirzapur-07, Lalitpur-06,

Jhansi-04, Hamirpur-01, Mahoba-06, Banda-01, Chitrakoot-01, Chandauli-03, Gorakhpur-01, Gonda-1 and Bahraich-02 and are managed by the Department of Fisheries UP and its 02 sister concerns: UP Fisheries Development Corporation Ltd and UP Fisheries Cooperative Federation Ltd. These reservoirs have very poor fish productivity due to insufficient stock of quality seed. Further, Sonbhadra, Mirzapur and some parts of Chandauli districts in the Bundelkhand region of UP, are enriched with reservoir resources which are either unutilized or underutilized with meagre fish productivity leading to a severe wastage of natural resources.

The proposed activity in UP-AGREES of integrated reservoir fisheries management is a complex activity starting from seed procurement to fish harvesting, post-harvest management all the way to the consumers' plates. Under UPAGREES support will be provided for stocking of reservoirs with quality fingerlings of Indian Major Carps and other suitable species, creation of captive nurseries for in-situ rearing of fry and advance fry for production of quality fingerlings of 100mm size for stocking, integrated development of reservoirs etc. Further support will be given under UPAGREES for large-scale cage cultivation in reservoirs. Similarly, wetlands like beels, ox-bow lakes, etc., need to be optimally harnessed and supported under the project.

Rationale

The 37 reservoirs in the UP-AGREES districts have very poor fish productivity due to unscientific fisheries management and insufficient stocking of quality seed against the recommended stocking density. There is no definite data of seed stocking and fish production available. The data collected through field surveys conducted on a case study basis from time to time by CIFRI reveals that the average fish production of reservoirs in UP is only **25kg/ha/yr** against its expected average bearing capacity in different category of reservoirs. In case of small reservoirs, it can be achieved upto 250kg/ha/yr while in medium reservoirs it can go upto 150 kg/ha/yr and 100kg/ha/yr in the case of large reservoirs. Insufficient stocking of seed and stocking material of low quality due to inbreeding and hybrid seed are the main reasons for low productivity, besides other constraints like multiple uses of the water, shrinking water holding capacity and climatic changes. These giant water resources are the backbone for marginal fish farmers, landless tribals and riparian population which traditionally derive their livelihood from them. To increase fish productivity, it is of paramount importance to stock culturable fish species and to grow fish seed to the desired extent in order to reap the benefits for the fishers.

Table 40: Name of Reservoirs identified under UP-AGREES

Year	Name of Reservoirs	Districts	Managed by	Total water area in ha	40% of total water area	Fund Required in Rs Cr
2025	Rihand	Sonbhadra	**D**	37325	14930	10
4	Naugarh	Chandauli	**D**	2074	829.6	4
	SaruaTaal	Gorakhpur	**F**	256	102.4	3
	Matatila	Lalitpur	**C**	10360	4144	6
	Sub-Total			**50015**	**20006**	**23**

2026	Jirgo	Mirzapur	**C**	39680	15872	10
7	Dhakwa	Mirzapur	**C**	4352	1740.8	4
	Govindsagar	Lalitpur	**C**	2428	971.2	4
	Rohini	Lalitpur	**C**	413	165.2	3
	Nagwa	sonbhadra	**F**	1220	488	4
	Pahuj	Jhansi	**D**	518	207.2	3
	Bagheltal	Bahraich	**D**	438	175.2	3
	Sub-Total			**49049**	**19619.6**	**31**
2027	Maudaha	Hamirpur	**C**	6839	2735.6	6
10	Kamala sagar	Jhansi	**C**	2460	984	4
	Jamini	Lalitpur	**C**	2260	904	4
	Pathrai	Jhansi	**C**	594	237.6	3
	Meja	Mirzapur	**F**	1800	720	4
	Musakhand	Chandauli	**D**	1275	510	4
	Kyolari	Mahoba	**D**	302	120.8	3
	Majhgawa	Mahoba	**D**	560	224	3
	Bhaisora	Chandauli	**D**	612	244.8	3
	Dahouratal	Bahraich	**D**	147	58.8	3
	Sub-Total			**16849**	**6739.6**	**37**
2028	Ghori	Mirzapur	**C**	4106	1642.4	4
10	Sukhra	Mirzapur	**C**	1669	667.6	4
	Chandrawal	Mahoba	**C**	1139	455.6	4
	Sahjad	Lalitpur	**F**	2993	1197.2	4
	Adawa	Mirzapur	**F**	1667	666.8	4
	Arjun	Mahoba	**F**	1823	729.2	4
	Dhanraul	Sonbhadra	**D**	2294	917.6	4
	Barua	Banda	**D**	1149	459.6	4
	Badwar	Jhansi	**D**	1012	404.8	4
	Kondar	Gonda	**D**	150	60	3
	Sub-Total			**18002**	**7200.8**	**39**
2029	Sajnam	Lalitpur	**F**	2375	950	4
6	Obra	Sonbhadra	**F**	1750	700	4
	Gunta	Chitrakoot	**C**	714	285.6	3
	Ahraura	Mirzapur	**D**	1120	448	4
	Raipura	Mahoba	**D**	295	118	3
	Salarpur	Mahoba	**D**	337	134.8	3
	Sub-Total			**6591**	**2636.4**	**21**
	Total 37 Reservoirs			**140506**	**56202.4**	**151**

40% of Total Reservoir Area is proposed for Integrated Reservoir Fisheries Development-56202.4 ha.
D = Department of Fisheries - 16 Reservoirs
C = UP Fisheries Development corporation -13 Reservoirs
F = UP Fisheries Co-operative Federation - 8 Reservoirs

All reservoir support activities will be 100% funded by the project whereby inputs and equipment will be purchased and distributed by the project team.

Process

The recommended procedure involves relevant data collection to fully understand the reservoir profile; preparation of detailed project report for implementation; review and approval by the Project Management Unit (PMU); and implementation of the activities.

Data collection: It is an important initial step to fully understand the profile of the water body. The data will include physical and hydrological knowledge, biological evidence, and

social economical information. The DoF will submit the "draft action plan for reservoir management" which will cover most of the information except for some vital aspects such as primary productivity and profile of the plankton availability. Most importantly, the primary productivity is used to estimate the carrying capacity of the water body which will directly provide guidance for fish stocking requirements.

One of the important parameters is to measure the size of the water body which is often difficult as it varies significantly depending on the season and year to year. Therefore, proper scientific method needs to be followed to estimate the area of the reservoir.

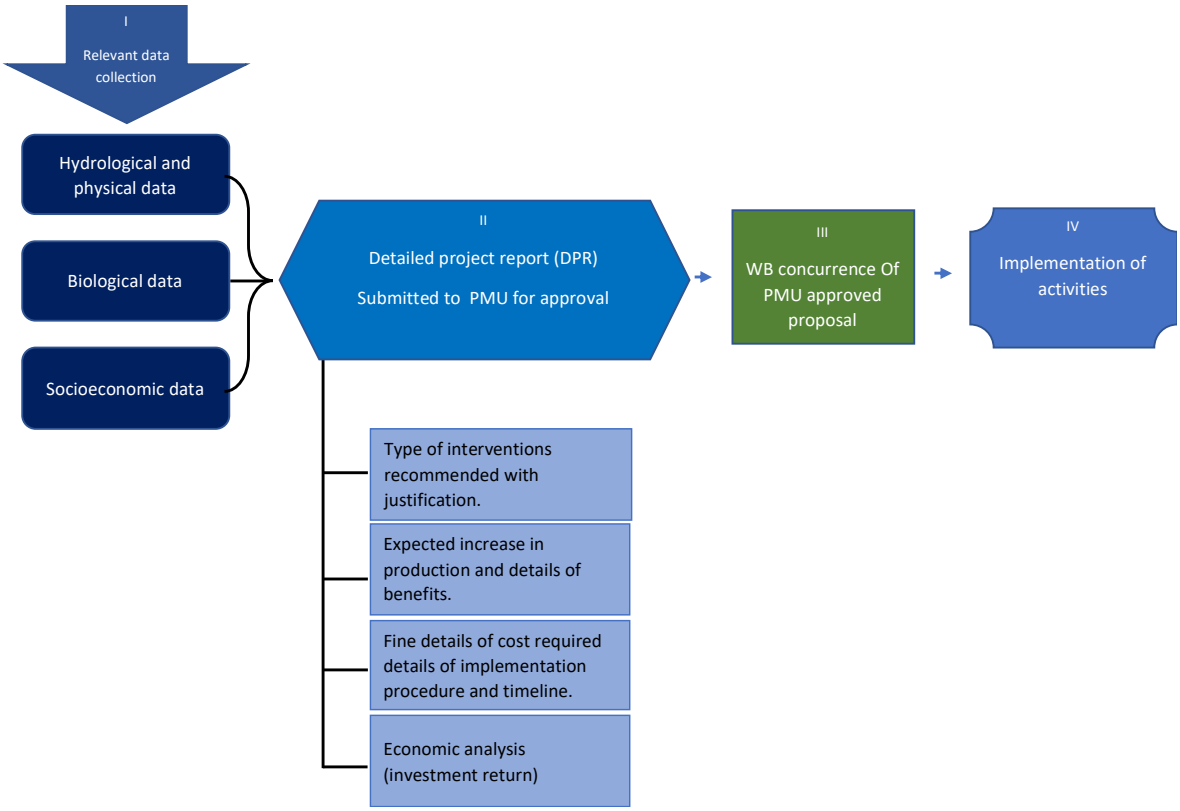


Figure 26: Implementation process for reservoir fish production

Detailed project report: Based on the data collection mentioned, a detailed project report needs to be prepared. It is important to interpret the data based on scientific evidence for technological interventions. Similarly, management arrangements need to consider the socio economic and cultural aspects. Every activity proposed for the implementation needs to be supported by full justification. There is also a need for illustrating the benefits to the number of families and expected production increase thereby related to economic benefits and associated costs. Economic analysis needs to be carried out so that investment returns can be fully understood.

Proposed Implementation Activities

Reservoirs fish production will be increased through in-situ seed rearing of good germ plasm in the form of quality fingerling under the technical supervision and support of ICAR- CIFRI and other related organizations of repute and through training and hand holding of human

resources by the appropriate universities. Besides production enhancement and post - harvest management like fish processing, cold chains, supply of well-preserved fish for greater shelf life and marketing avenues will be promoted. The underutilized huge water potential of about 1.40 lakh ha of reservoirs will be tapped to increase fish production and meet the ever-increasing domestic fish demand and also create ample employment opportunities. The average fish productivity from reservoirs in UP is estimated to be 25kg/ha/y and it is assumed that the UP-AGREES project interventions will increase it to an average of 100kg/ha/y.

Table 41: Reservoir Fisheries (Culture based Capture fisheries)

Activity	No of reservoirs	Area (in ha)	Cost of Stocking of fish seed to be reared in situ through pen and cages (Rs. In lakh)
Production enhancement through integrated reservoir production and resource management	37	140052	15100
Year wise breakup of target			
2025	4	49561	2300
2026	7	49049	3100
2027	10	16849	3700
2028	10	18002	3900
2029	6	6591	2100
Total	**37**	**140052**	**15100**

Establishment of Captive Nurseries

The reservoirs based on its size would be utilized for mass scale nursery rearing of seed with proper management practices including manuring and feeding.

To harness its fisheries potential to the optimal level, the project has proposed in-situ rearing of quality seed by installing sufficient number of cages and erection of pen culture as **captive nurseries**. Suitable areas within selected reservoirs will be identified for installing pens and cages. This will be done in collaboration with local authorities for necessary permissions and clearances.

Technical assistance and necessary guidance will be provided for the construction and maintenance of pens and cages by the technical knowledge partner agencies and TSA.

During the rearing period, it is proposed that seed is supplemented with formulated fish feed to attain the size of 80-100 mm and then released into the reservoirs to grow on natural food. This stocking will replenish the fish stock in the available ecological niches leading to enhanced fish production. These practices will be implemented by technical support of ICAR institutions and implemented by involving local Fish Producer groups (FPGs) in the clusters, supporting them with technical and input support on goods and equipment supply and under close monitoring by DPIUs and PMU.

Table 42: Number of cages to be installed in reservoirs

Activity	No of cages	Reservoir Area (in ha)	Cost of installation and management of cages (Rs. In lakh)
Installation of Cages	1500	140052	4500
Year wise breakup of target			
2025	300	49561	900
2026	350	49049	1050
2027	350	16849	1050
2028	350	18002	1050
2029	150	6591	450
Total	1500	140052	4500

*Total reservoir area is 140,052 ha; active area is 56,200 ha and operational area is 2810 ha. Number of pens will depend on the suitable sites and its areas in shallow waters connecting with reservoir waters. These captive nurseries will be taken care of by the respective FPGs to be formed under integrated reservoir fisheries management. It is proposed that 750 cages will be used for seed rearing, and the rest 750 cages will be reserved as fish grow out units granted to these groups to run for their sustainable livelihood and better resource management for enhanced production. It will be arranged within the proposed financial arrangements as per the cost tab.

Other facilities like Landing centres, cool chains, postharvest management practices will be developed by the technical support, demonstrations and hand holdings from ICAR- fisheries Institutes (CIFRI, Barrackpore and CIFA, Bhubaneswar). Depending on the suitability, solar energy will be used for lighting, aerating, and pumping.

In order to implement this activity, UP-AGREES will enter into a tripartite agreement with DoF/ UPFDC/UPFCF (depending on the fisheries management) and the Department of Irrigation, UP for seamless project implementation during the entire project period. These nurseries will be planned, designed and constructed as per DPRs which will detail out the construction of required civil works like landing centres, working shades, solar lighting, approach roads etc.

The activities will also include other civil structures like cement/ kutcha earthen nurseries to rear fish seed, fry to fingerlings, pump, pump shed and inputs-fish seed (fry). DPRs and design for civil works will be prepared by hiring a **Project Monitoring Consultant (PMC)** followed by inviting open tender bids as per the procurement manual. The successful contractor will execute the construction works which will be closely monitored by the hired PMC and third-party evaluation including the concerned State Fisheries organization (DoF/UPFDC/UPFCF) who looks after the reservoir fisheries management.

All the activities and inputs related to reservoir nursery development will be 100% funded and procured directly by the Project.

Training and Capacity Building

There exist various technical institutions/ ICAR institutions and institutions like Central Inland Fisheries Research Institute (CIFRI) that may be engaged to provide training to the

DoF staff and field level teams in water body-based production models and technical support for the initial implementation of the reservoir management program.

Table 43: Training on integrated reservoir fisheries production and resource management

Activity	No of trainees		Estimated cost on training (Rs. In lakh)
(B) Training of fish farmers	300		60.00
Total	350		72.50
Year wise breakup of target			
Year	Project staff	Fish farmers	
2025	10	60	14.50
2026	10	60	14.50
2027	10	60	14.50
2028	10	60	14.50
2029	10	60	14.50
Total	50	300	72.50

2B.3 Sustainable Increase of Productivity in Ponds and Reservoirs

The aim of this activity is to improve aquaculture performance in the project area. Key investments under this category will underpin activities designed to transform the inland fisheries sector by not only enhancing fish productivity and profitability in a sustainable manner but also by ensuring quality in production and product accepted by food safety standards.

Aquaculture productivity in the selected clusters area is **below the potential for three main reasons**:

- lack of quality fingerlings (juvenile fish),
- lack of technical know-how (especially intensive rather than extensive culture practices) and
- weak extension support.

UP-AGREES will address these constraints through:

2B.3.1 Assured Supply of Improved SeeD

On-station pure line breeder development will be introduced under the project. The purpose of this activity is to improve the genetic potential of available fish seed. This will involve four activities:

Establishment, Modernization and Upgradation of Hatcheries and Stock Improvement of Pureline Breed

Rationale:

With growing trend of aquaculture activities and diversification of fish culture, the demand for fish seed is growing. It is estimated that the UP domestic fish supply demand is 14.59 lakh tonnes with 11.09 kg/capita fish consumption registered in year 2020-21 where as

40% of aquaculture resources are either unutilised or underutilized because of many reasons. Out of that main reason is the shortage of quality seed and even majority of available seed is in the form of inbreeding produce.

Fish farmers in UP state are heavily dependent on seed from other states to meet their demand. There is high scope for increasing their capacity to produce more spawn and rear spawn up to fry. The availability of quality fish seed at the right time and at the right location is a prerequisite for sustainable aquaculture development. 9 major fish hatcheries run by UP Fisheries Development Corporation have been operating with maximum seed production capacity of 360 million fish fry and 32 departmental small sized fish farms produce only 70 million fry and hence are not able to meet the state fish seed demand. It is estimated that UP requires about 5000 million fish fry to meet the State fish demand of 14.59 lakh tonnes while the fish seed production of UP in 2020-21 was around 3233.31 million only. Approximately 80 percent of fish demand is mitigated and supplied from 256 private hatcheries which mainly supply IMC and exotic carps whereas seed of commercially important fin fish (pangasius, Jayanti rohu, amur carp, Gift tilapia and other cat fishes) and shell fish (genetically improved scampi and fresh water prawn) are being imported from West Bengal and Andhra Pradesh.

It is essential to expand (both horizontally and vertically), intensify and diversify inland fisheries and aquaculture, focus on diversification of species, introduction of new species and bridge the critical gaps in the demand and supply of quality brood and seed of cultivable species and species-specific feeds. Adequate number of brood banks, hatcheries, seed rearing units, specific pathogen free or resistant seed, genetically improved brood stock, and feed mills have to be established.

With the induction of new age aquaculture technology based on per crop more crop concept in form of **Recirculatory Aqua culture System (RAS)**, **Biofloc** and **pond Biofloc** being adopted by many fish entrepreneurs with higher productivity. These practices require specifically controlled conditions and require considerably higher operational costs mainly on inputs like quality seed and feed. Seed of such fish species are not readily available in UP and are being supplied from W. Bengal and Andhra Pradesh. Besides there are regulatory restrictions imposed on culture of Gift Tilapia whereby they are not allowed to enter the main inland water streams because of its prolific breeding habits which would be detrimental to natural fish fauna in long run. Pangasius culture in ponds and tanks are gaining pace, since it was introduced in UP in 2008 with a meagre 5000 seed which has now touched 200 million fry in 2020-21. For better fish yield through cross edge technology, assured supply of the genetically improved variety of Gift tilapia and pangasius (through mono culture) and other species like GI scampi and sea bass etc are the basic need of this sector.

Further, inbreeding is one of the key factors hampering fish productivity. Implementing selective breeding programs can help to maintain genetic diversity and improve desirable

traits such as growth rate, disease resistance, and reproductive performance. By selecting breeding with the desired traits for breeding, the genetic quality of the brood stock can be improved over successive generations.

Implementation

This activity aims to maintain the quality of seed in order to increase production.

Modernization of Government hatcheries

Based on the area available for expansion and water availability, existing government fish seed farms, will be utilized for enhanced seed production. It is planned that 05 pre-existing Government fish hatcheries Gomati Hatchery, Lucknow; Rapti Hatchery, Basti; Sarayu Hatchery, Ayodhya; Meja hatchery, Prayag Raj and Konch hatchery, Jalaun being run by UP Fisheries Development Corporation will be modernized by setting up modern structures and equipment, increasing nursery area, making water supply arrangements etc for improved varieties of fish seed. Construction work will be executed under administration of the District Collector concerned under the technical supervision of the District Fisheries Officer.

Table 44: Modernization of existing Government Hatcheries

Activity	No of hatchery	Unit cost (Rs. In lakh)	Project Cost (Rs. In lakh)
Modernization of Govt. Hatchery	04	200	800
Year wise breakup of target			
2025	02	200	400
2026	02	200	400
Total	04	-	800

New mini hatcheries

2 mini fish hatcheries will be established in Devipatan division as a beneficiary-oriented activity with 60% grant support under the project and 40% beneficiary contribution.

These hatcheries will be established on the land of the selected beneficiaries who own a minimum of 1ha land and no Government land will be used for the purpose. Beneficiary selection will be made by inviting applications from aspirants after duly publishing advertisements in widely circulated new papers. Selection criteria will be made and those who have already benefited earlier under any Govt. scheme for this activity will be excluded.

Hatcheries for pure line breed

4 dedicated hatcheries will be established one in each cluster with 100% grants for proliferation of pure line breed and replication of quality brood stocks for easy access to fishers to get the certified seed of their choices within their cluster area. These may be established through Central and State Agriculture universities to demonstrate seed management besides ensuring good quality of seed to FPGs and fish farmers.

The focus would be on developing the hatcheries for commercial species that can fetch a better return to the fishers. The project will provide 100% assistance under this category. CIFA and National Bureau of Fisheries Genetic Resources (NBGR) will oversee the technical matters and collaborate with the Department of Fisheries (DoF) in establishing and modernising hatcheries.

Table 45: Establishment of Private Pure line breed and Mini Hatcheries for Fish Production

Activity	No of unit	Unit cost (Rs. In lakh)	Project Cost (Rs. In lakh)
Establishment of private hatchery	02	25	50
Year wise breakup of target			
2025	01	25	25
2026	01	25	25
Total	02	-	50

Table 46: Establishment of Pure line breed Mini Hatcheries for quality Fish seed Production

Activity	No of unit	Unit cost (Rs. In lakh)	Project Cost (Rs. In lakh)
Establishment of Mini hatchery for Pure line breed	04	25	100
Year wise breakup of target			
2025	01	25	25
2026	02	25	50
2027	01	25	25
Total	04	-	100

Stock improvement of genetically improved farm tilapia (GIFT), pangas, Indian major carps.

Genetically improved varieties of fish are propagated to overcome the problem of inbreeding of fish in the same area and to increase productivity. At the national level, the pure line breed fish are produced in brood banks set up by the National Fisheries Development Board and are multiplied at the state level by state governments. Pure line breeding is used to "fasten" desirable traits in a breed. Seed of Amur carp, an improved variety of Common Carp is available which can be accessed from Karnataka state. Similarly, Pangasius seed can be procured from hatcheries in Kolkata, Jayanti rohu seed from Central Institute of Freshwater Aquaculture (CIFA), Bhubaneswar. Care would be taken to sensitize the farmers on the Brood Stock development through Best Management Practices (BMP).

To ensure good quality of fish seed with traceability, it is proposed to set up a **State Brood Bank at Gomati Hatchery, Lucknow** owned by UP Fisheries Development Corporation Ltd with the technical assistance and guidance of ICAR Institutions- **National Bureau of fish Genetic Resources (NBFGR) and Central Institute of Fresh water Aquaculture (CIFA)**. NBFGR will be the nodal agency who will associate with CIFA to carry out the implementations.

Wild brooders of Indian Major Carps (IMC) and minor carps will be collected from the Ganga Basin and will be reared for repeated selective breeding under control condition at Gomati hatchery to develop brood stock to get genetically improved seed. Improved seed of Jayanti Rohu, Amur Carp and Gift Tilapia will also be procured from National Fisheries Brood Bank, Bhubaneswar and also from National Fisheries Development Board **(NFDB),** Hyderabad. The progenies thus obtained will be procured by 04 satellite hatcheries managed by UP Fisheries Development Corporation Ltd at Rapti Hatchery, Basti, Saryu Hatchery Faizabad, Meja hatchery Prayag Raj and Konch hatchery at Jalaun.

Pure line germ plasm of selected fish species will be 100% procured by the project at government hatcheries to develop brood stocks. Improved variety of generation one seed will be further broadcasted to private hatcheries to nurture and propagate ensuring sustainable supply chain for readily available seed to the fish farmers practicing in community ponds or individual ponds in the project area. **These seeds will be procured by UP-AGREES project and supplied to fishers as in kind.**

Table 47: Training on pure breed line and hatchery management

Activity	No of trainees		Estimated cost on training (Rs. In lakh)
(A) Training of departmental staff	150		37.50
(B) Training of fish farmers	600		120.00
Total	750		157.50
Year wise breakup of target			
Year	Project staff	Fish farmers	
2025	30	120	31.50
2026	30	120	31.50
2027	30	120	31.50
2028	30	120	31.50
2029	30	120	31.50
Total	150	600	157.50

Training will also include important aspects like water quality management, feed management, disease prevention, and harvesting techniques especially in reservoirs.

Establishment and Promotion of World Class ***Hatcheries:***

UP AGREES will aim to support private sector partners who are renowned in the field of establishing and running world class hatchery. it is envisaged that establishment of such State of Art Hatchery by private sector will not only boost the economy in the state but also help in accelerating the pace of fishery sector growth in state of Uttar Pradesh.

Demonstration of Fish Nurseries

Rationale:

Fish seed includes various stages of growth i.e. spawn, fry, advance fry, fingerlings, advance fingerlings and yearlings are transported live. Given that their availability is limited to breeding season, special care and attention needs to be taken to avoid mortality during transportation due to mechanical injuries and high BOD. While on one hand, the procurement of fingerlings at the right time is quite difficult due to its limited availability and high demand, on the other hand, transportation of live fingerlings more than 60-80 km of distance is risky and involves expenditure towards labour and transport.

With surge of aquaculture practices, a paucity of quality fish seed has been experienced since the last 2 decades. In case of IMC culture, it is recommended to stock 100 mm sized seed (fingerling) @10,000 number/ha/yr in grow-out ponds for better fish yields. To address these issues and to address round the year availability of quality seed for reservoir fish production, in-situ seed rearing and captive nurseries in form of cages and pens is proposed through UP-AGREES.

These efforts to improve local availability of quality seeds/fingerlings at affordable prices will help to increase the fish production in the State and make it self-sufficient to meet its fish demand.

Implementation

The project will support demonstrations of best nursery management practices in farmers' ponds throughout the project area.

Lead farmers/ hatchery owners will be identified to develop these demonstration fish nurseries with support of the technical team. The project will support suitable incentive for undertaking this activity.. Selection of beneficiaries will be done after calling online applications through advertisements with certain criteria made for selection. The progress would be monitored by DPIUs and PMU.

Small but stable farmers will be targeted for this activity. In addition to technical support and training, they will be supported with supply of quality seed from hatcheries that would have received fish breeding stock and management training from CIFA and the local University (College of Fisheries). The expected result is a sufficiently critical number of nurseries in the local area to meet the demand of fingerling needs of all categories of fish farmers.

Table 48: Nursery Enterprise promotion: Seed value Chain

Activity	No of unit	Unit cost (Rs. In lakh)	Project Cost (Rs. In lakh)
Nursery Enterprise promotion: Seed value Chain	120	2.00	240
Year wise breakup of target			
2025	15	2.00	30.00
2026	25	2.00	50.00
2027	30	2.00	60.00

2028	35	2.00	70.00
2029	15	2.00	30.00
Total	120	-	240.00

Demonstration of good aquaculture practice through commodity clusters

Majority of community ponds remain underutilized or unutilized and do not respond to their production potential. A similar scene is common in the reservoir sector as well. To address these challenges, the proposed intervention is invoked to enhance average fish productivity from the current status of 4000 kg/ha/y to 7000 kg/ha/y in the case of community ponds, and from reservoirs, it is aimed to enhance from the current average productivity of 25 kg/ha/y to 100 kg/ha/y.

Commodity clusters of 1700 FIGs will be formed (1400 FIGs for community ponds and 300 FIGS for reservoirs), and they will be assisted under the project by scaling up their skills and know-how about modern aquaculture technology through training and by supplying them with one-time assistance to procure quality inputs (seed, feed, fertilizers, organic manures, probiotics, etc.).

To embrace modern aquaculture technology for boosting fish production from community ponds, 525 ha of selected private ponds, particularly those owned by local lead fish farmers, will be developed as demonstration sites to show case and disseminate modern fish technologies to the selected base line fish farmers for replication. After one year of operational assistance, the community ponds the project will look forward to ensuring the sustainability of the activities of stakeholder groups through handholding, training, and interaction with them on a periodic basis throughout the project period, as well as by addressing their issues and providing a way forward.

Table 49: Demonstration of good aquaculture practice through commodity cluster (Community Ponds)

Activity	Area Coverage (ha)	Unit cost (In Rs Lakh)/(ha)	No of ponds (Estimated)	Cost in Rs Lakh
Production enhancement in community ponds	20000	1.60	28500	32000
Year wise breakup of target				
2025	2000	1.60	3300	3200
2026	4000	1.60	6500	6400
2027	6000	1.60	7700	9600
2028	6000	1.60	7700	9600
2029	2000	1.60	3300	3200

Technical support will be provided through lead fish farmers, and scientific interfaces will be done through external partner agencies and field functionaries. The most important aspect of sustainability is financing. That support will be given to fish farmers through the Fish Farmers KCC, up to Rs 1.60 lakh to each needy fish farmer without collateral guarantee. This is a common requirement for agriculture and fisheries activities and is directly associated with the subcomponent 3B Agri Finance ecosystem, which is meant to support

fishers and farmers as well. Institutional financing will be done in accordance with the RBI's Guidelines issued in 2019 for KCC admissible to fishermen and fish farmers through the coordinated efforts of UPAGREES, NABARD, and lead banks. DPIUs will undertake this by creating awareness and sensitization among the beneficiaries.

2B.3.2 Fish Feed Mills for Cost efficient fish feed suitable to designed aquaculture.

Rationale:

Feed is a significant input in the fishery sector and plays an important role in higher fish production. The candidate species for aquaculture require specially formulated fish feed for higher productivity. Fishes naturally survive on natural food produced in the form of phytoplankton and zooplankton, whose numbers in a pond ecosystem is the deciding factor for the fertility of ponds and constitute the biological composition of the culture medium. However, intensive fish culture aims to improve fish production and fish productivity and maximize financial gains. Hence it depends on formulated fish feed which is made up of different ingredients in definite formulation and percentage of protein, carbohydrate, fat, moisture, fibers and mineral mixtures in order to offer a balanced dietary requirement to the fish being cultured in high density. Use of formulated feed is very scanty in practice because of the public perception that fish can survive without feeding. Unavailability of feed in remote rural areas in abundant quantity and its cost (a major chunk of operational cost) are other reasons due to which fishers are unhabituated and reluctant to use it. **In modern aqua culture practices, pangasius, singhi, Indian magur, Gift tilapia , sea bass, scampi are being reared in RAS, biofloc and pond floc where as in reservoirs through cage culture which are entirely dependent on feeding. UP-AGREES aims to boost fish production from aqua culture and reservoir fisheries through commodity cluster formation, hence inclusion of formulated feed is essential.** To narrow down the gaps between supply and demand of feed, establishment of fish feed mills is proposed.

Implementation

Small Fish Mills will be established by selecting FPGs and where possible youth entrepreneurs. Preference will be given to those having past experience of working with involved technology or unemployed youths having diploma or BFSc degree and willing to setup fish mill. Small size fish feed units will be established as production supportive ventures by encouraging youth with project assistance. The project will support suitable financing mechanism and incentive for undertaking this activity.

Fish feed mills will be established by the beneficiaries using locally available ingredients with the support of the project CPIT along with help from CIFA. These fish feed units aimed at better Food Conversion Ratio (FCR) using improved formula could be operated easily by the beneficiaries/select FPGs after sensitizing them to fish nutrition technology.

Beneficiaries will be selected by the project based on a certain criterion such as:

- the person/group/organization who have availed similar benefits earlier under any other scheme will be excluded
- submission by the beneficiary of a bankable business plan to avail project support
- beneficiary contribution is estimated tentatively to be 40% of the unit cost
- the feed production unit will be established by the beneficiary
- an agreement will be signed with the beneficiary to cater to the feed requirement of the fishers of the project area as a priority
- the project support will be one time for each unit
- the activity and benefits will be monitored and learning lessons will be documented.

Table 50: Establishment of fish feed production unit with capacity of 8t/day (Cluster) village tanks and ponds

Year	Unit Cost in lakh	No of unit	Rs. In lakh
2026	100	5	500
2027	100	6	600
2028	100	6	600
Total		17	1700

Table 51: Training of project staff and fish farmers pertain to feed formulation

Training of project staff	No of Trainees	Unit Cast for training expenses in Rs. Lakh
2025	20	5.0
2026	30	7.5
2027	30	7.5
2028	20	5.0
Total	100	25.0
Training of lead farmers		
2025	200	40.0
2026	200	40.0
2027	400	80.0
2028	250	50.0
Total	1050	210.0

Quality Fish Seed and Feed Procurement and Training:

District/ division level partnerships will be established with certified fish hatcheries to ensure the availability of high-quality fish seed. Formulated feeds will be procured through inviting e tenders from interested and reputed fish feed firms through e-procurement rules as applicable in Uttar Pradesh through the PMU.

Training camps will be organized to facilitate training programs for local farmers on the importance of quality seed, feed selection and involved technology enhancing fish productivity.

2B.3.3 Updated Technology Diffusion of innovative technologies through demonstration and extension services

In order to introduce the latest innovative technologies to famers so that they have the choice of selecting farming practices suitable to their environmental conditions. Introduction of the technologies for demonstration will be **supported 100% by the project through grants**, and be carried out by FPGs that participate in demonstrations at strategic locations and through extension services.

Demonstration sites will be developed by lead fish farmers to disseminate fisheries technology to progressive and base line farmers and to render trainings. Lead farmers will develop these models at their own ponds with project support to showcase a variety of fisheries activities. All the inputs and technical training will be provided by the project.

The following innovative technologies will be demonstrated:

Carp Polyculture. The project will work to improve management practices for carp/tilapia polyculture. Carp production is the most commonly practiced form of aquaculture but yields tend to be very low due to inadequate management. Simple management procedures (stocking the correct ratios of different species, regular fertilization and feeding etc) can easily double the output of these systems which can also be raised further by the addition of tilapia and freshwater prawns.

Semi Intensive Fish Monoculture. This activity will aim to introduce intensification of aquaculture in the project area. The fish species considered include GIF tilapia and improved pangas and high value fish, barramundi (*Lates calcarifer*).

The existing fishponds will be utilized to demonstrate semi-intensive[26] fish culture. Demonstrations will be taken up in selected ponds with 100% project assistance. Demonstration sites will be developed by lead fish farmers to disseminate fisheries technology to progressive and base line farmers and to render trainings. Lead farmers will develop these models at their own ponds showcasing variety of fisheries activities and will get grants from the project.

The trained progressive fishers from FPGs will be selected and sensitized through capacity building and demonstrations to adopt semi-intensive production models. The project will provide demonstration and subsequent adoption support.

Cage Culture will target the fishers dependent on the reservoir and living close to water bodies. As a part of developing the capture cum culture sector (reservoirs) cages will be

[26] In extensive fish farming, fish production relies on the natural productivity of water which is only slightly or moderately enhanced. Externally supplied inputs are limited; costs are kept low; capital investment is restricted; the quantity of fish produced per unit area is low. On the other hand, intensive and semi-intensive fish farming imply that the quantity of fish produced per unit of rearing area is high where production factors, quality of water and quality of stocked fingerlings are controlled to improve production. There is steady monitoring during the production cycle.

located in water bodies close to the homes of demonstration group members. The project will provide demonstration inputs and technical support.

Pen Culture: The project will promote pen culture[27] in appropriate water bodies with lesser depth for fish production. The project will promote pen culture on demonstrative mode with 100 % project assistance. The cost includes the cost of pen materials, poles, installation, feed and watch and ward. It will be planned, designed, constructed, and managed under the supervision of the concerned Fisheries Officer, under CPIT and DPIU. The material will be procured locally and the fishers will be trained before commencing the activity.

Under reservoir fish production, pens and cage materials will be 100% procured by the DPIUs and installed at the community level to be maintained locally by the fishers/ farmers groups (FPGs) as a community-based activity. Whole expenditures to be incurred on procurement and installation will be borne under the project as one time assistance and from the second year onwards operation the FIGs will maintain and run these cages from their own resources or by securing crop loans under KCC as provisioned in subcomponent of 3B of Agri finance.

Other innovative farming practices demonstrated under the project: The specific objective of this intervention is to demonstrate site-specific technology packages that can adapt to climate risks in real farming conditions. These innovative fish farming practices will be executed by selected beneficiaries through project support.

Key interventions include: (i) innovative technologies such as biofloc fish farming; (ii) recirculatory aquaculture system (RAS); and (iii) promotion of short fish production models considering winter temperature.

These innovations are based on the theme of per drop more crop pattern used in fish farming with intensive fish farming where less water is used by scientific approach to maintain water quality under controlled condition.

Training and Capacity Building:

Workshops and training sessions will be organized to educate farmers and involved field functionary on modern aquaculture and reservoir techniques, including pen and cage culture. Different Kinds of year wise training camps are proposed for capacity building and skill development through engaging external partner agencies of national and international reputes and central and State Agriculture Universities.

[27] A Pen is defined as a fixed enclosure in which the bottom is the bed of the water body. Some of the advantages are: intensive utilization of space; Safety from predators; ease of harvesting; and when compared with the cage, pens can be made much larger; and construction cost of pens will be cheaper than that of cages ensuring flexibility in size and economy.

Technology Diffusion:

Units for demonstration and proliferation of new age aquaculture technology will be installed in private ponds of lead farmers situated in the vicinity of community cluster ponds. These demonstration sites will show case the technology to fishers in order to encourage them to replicate the technology and also provide training and practical dissemination to them, boosting their skill and ability through active participation.

Table 52: Year-wise target for Fisheries Technology Diffusion

Activity	Area Coverage	Unit cost (In Rs Lakh)	No of Site	Estimated cost in Rs Lakh
Demonstration sites for aqua culture Practices using formulated feed	525 Ha	4.00	1050	2100
Year wise breakup of proposed target				
2025	100	4.00	200	400
2026	100	4.00	200	400
2027	200	4.00	400	800
2028	125	4.00	250	500

2B.4 INTEGRATED AQUACULTURE HUB AND Ecopark

Rationale:

Concept of Aquaculture Hub and Eco park

The Tarai belt of UP lies at the foothills of the Himalayan range and stretches from North Western UP to North Eastern UP, bordering Nepal, and is bestowed with rich biodiversity. Many streams of waters in the form of small rivers and seasonal drains from the Nepal region traverse UP, with ramifications for different water resources. Such geographical areas in the project mainly fall in Devipatan and Basti divisions. Especially Baharaich district is enriched with huge water potential. One such water body popularly known as **Tal Baghel** owned by Department of Fisheries, UP is situated in Payagpur tehsil of district Bahraich measuring water area of 439 ha and can be developed as fish production hub cum Eco Park. Such giant water bodies remain unutilized and, in the long run, might become extinct owing to their non-utilization, without maintenance, and due to encroachment. It is the need of the hour to pay attention to conserving these water potentials through public awareness towards the restoration, repair, and renovation of natural water resources, along with their economic use for the greater public interest. This can only be done through a meaningful economic operation in the form of an aquaculture production hub and eco-park that creates public awareness through knowledge and amusement activities.

The integrated aquaculture hub and Eco Park were developed after taking into consideration the evolving macro- and micro-level ecosystems marked by ecological, economic, and livelihood challenges facing society. The priority, according to the project perspective, would be the creation of the infrastructure for ecological, social, and economic sustainability in the

aquaculture industry. The need to combat global warming and climate change while creating carbon-negative food production systems warrants looking for innovative solutions.

The concept of carbon-negative food production has to be reinforced with the idea of creating high-quality and healthy protein to sustain the requirements of a growing global population. Aquaculture would have a major role in the development of a carbon-negative food production system filled with healthy proteins.

As a part of promoting entrepreneurship, project will develop integrated aquaculture hub and eco park. This will also demonstrate sustainable water management, conservation of native fauna and flora and environmentally friendly way of fishing and aquaculture.

The introduction of symbiotic farming practice is one of the methods to move away from harmful farming practices using antibiotics and chemical pesticides. The focus of symbiotic farming based on eco-friendly and sustainable practices envisages a high-quality food production system with end-to-end traceability.

The integrated Eco Park is designed to mimic the natural aquatic ecosystem in the food production cycle. The concept involves integrated multiple technologies and sustainable practices such as the Recirculating Aquaculture Systems (RAS) Biofloc System, integrated agri aquaculture farming, system automation, and smart monitoring.

Fisher Producer Organisation (FPO) is the pillar of the project. FPOs would be provided with end-to-end solutions and services farming technology and management. The plan is to create an integrated eco-friendly and sustainable food production systems.

Implementation

A PMC will be hired use a competitive bidding process using the procurement guidelines of the project to develop a Detailed Project Report (DPR) covering the financial, ecological, technological, and social impact of the **integrated aquaculture hub and ecopark**. The DPR will be reviewed and approved by the PMU and endorsed by the World Bank before the start of the implementation.

The implementation site for the aquaculture hub and ecopark is proposed to be a government asset that will be leased out for a long period (not less than 07 years lease) in the name of a registered fisheries Cooperative society/ FPO active in the area. A suitable financing mechanism with provision of incentive from project will be made to provide credit/funding for this proposed activity. . It is aimed that about 10 new FPGs will be inducted into the running of the hub and ecopark and will be integrated with the FPO.

2B.5 Formation of Market Linkages and Strengthening the Value chain

Rationale

During post-harvest fishing operation, the following factors are responsible for fish losses:

During fishing:

Setting fish gears and net into the water for long periods, causing fish to spoil, falling from net or discarded as by catch, poor hygienic practices of fishermen, use of destructive /harmful methods of fishing; dynamite/carbide, delay returning to landing centers after fishing and exposure of fish to high temperature.

During unloading:

Poor hygienic practices causing contamination, Mishandling: Fish falling from basket on to the shore lead to physical damage, stepping on fish, causing physical damage,
Mismanagement in watch and ward; poaching and thefts at unmanned landing centers;
Failure to gut wash and chill the fish at landing centers.

During Storage:

Growth of mold causes spoilage and makes the fish damp, Insect consume fish during storage, discolouration owing to chemical changes, Inadequate cold storage facilities,
High risk of damage to fish during supply network from onsite fish ponds to whole sellers to retailers.

During fish marketing:

No organized fish markets, no access to or lack of marketing infrastructure. middlemen ship, deliberate delay in purchasing the fish by traders making syndicate owing fishers to distress sales scare spoilage of fish due to unavailability of cool chains, Inadequate application of ice and no insulator container used, Unhygienic and stressful environment of Fish Markets, Delay in selling and inadequate cold storage facilities for unsold/over left fish in fish markets.

The key objective of this activity is to provide better price for the product thereby increasing farmers profitability and delivery of quality/hygienic fish product to consumers. This will involve creation of suitable market linkages for better access to markets by strengthening the value chain for improved product value realization and reduce fish loss during post-harvest management and hygienic marketing. Post-harvest management, strengthening marketing channels and remunerative linkages are important components in aquaculture and capture sectors. The produce must be properly preserved and taken to the market without spoilage. The project will facilitate in improving the supply chain of fish through different measures. Access of these facilities will be based on strict selection criteria. FPGs will be given priority in accessing these facilities and interested entrepreneurs, at a cost.

2b.5.1 Establishment of Fish Landing Centers for Reservoirs

The fish landing centers are the initial vital link in the fish value chain with adequate post-harvest facilities enabling the FPGs to prevent post-harvest losses and maintain the quality of fresh fish. Often, fish landing centers where the catch is pooled do not have the infrastructure facility for segregating, grading and preserving fish in ice for quick transport to fish markets. This project will help in creating hygienic facilities for post-harvest fish handling, fetch better prices for the catch and reduce.

The project will consider supporting the construction of fish landing centers associated with reservoirs that have a water spread area of 10 ha. and above. The landing centers will have other facilities like storeroom and water supply. The project will support in establishing fish landing centers with 100% project assistance. This infrastructure will be constructed on readily available Government land and the project will not support acquiring land. The landing centers will be managed by the concerned fishery FPGs.

The exact number of landing centres will be finalized only after a detailed field survey of the reservoir sites. However, a minimum 30 landing centres will be established as per basic estimation and have been costed in.

2b.5.2 Modernize Fish Markets

The project will support in establishing new markets if land is readily available and based on suitability. The fish markets will be designed with all modern facilities with an emphasize on delivering quality fish and fish products to consumers in a hygienic environment.

Two new modern fish markets are proposed under the project one in Jhansi and other in Gorakhpur. A PMC will be hired using a competitive bidding process as per the procurement guidelines to design and execute the activity under the supervision of the PMU and DPIU. UP-AGREES will provide funds for civil works and related required amenities like cold chain, ice plants and ETP, while the Government will provide land free of cost.

2b.5.3 Introduction of Mini Fish Processing Units

Nearly 90% of the inland fish produced is marketed without any processing. At the same time, there is good demand for fish fillets, cut fish and cleaned products in both domestic and export markets.

To improve the fish value chain, the project will support in establishing mini-processing units in suitable locations, with required facilities for the primary processing of fish. The units will be equipped with chilling rooms, fish processing and washing tables, backup generator and administrative offices. This would help in maintaining hygienic conditions and decrease post-harvest losses. Any FPGs, interested in establishing mini fish processing units will be supported under the project. .

Beneficiaries will be selected by the DoF following strict criteria such as:

- Persons/organizations who have availed similar benefits earlier under any other scheme will be excluded.
- The beneficiary will submit a bankable business plan to avail project support.
- Beneficiaries will contribute 40%(tentative estimation) of the unit cost.
- An agreement will be signed with the beneficiary to cater to the need of fishers of the project area, including fish purchase / collection from the project area.
- Project support will be one time for each unit.
- Processing unit will be established by the beneficiary.
- Activity benefits will be monitored by DoF and lessons learned will be documented.

2b.5.4 Establish Fish Retail Kiosks and promote Mobile Kiosks

The activity aims to provide consumers with better access to fish and fish produce and improved market access to fish farmers. Presently, fish is not being marketed in hygienic conditions and consumers have to travel long distances to get fish. For improved marketing, the project will promote kiosks/mobile kiosks with 60% support for the unit cost of establishing the kiosk based on the PMMSY guidelines. The beneficiary will also be trained in hygienic handling of fish and women will be preferred. However, this assistance will be in accordance with need and requirement of the suitable financial mechanism. Beneficiaries will be selected by the DoF following strict criteria fixed by the Dept. such as:

- The interested beneficiary has to submit self-contained business plan with full justification and technical details of kiosk/ mobile kiosk.
- They have to provide documentary evidence of the availability of required land free from encumbrances for stationary kiosk.
- The documentary evidence is required for financial resources, necessary clearances/permissions etc.
- The project will not support for purchasing land or taking it on lease basis.
- The interested beneficiary must deposit his/her contribution of 40%(tentative estimate) upfront to access project support.
- The beneficiary must give undertakings and ensure that kiosk/mobile kiosk will be used only for the sale of fish and fish products.
- Persons availed similar benefit earlier under any other scheme will be excluded.
- Project support will be one time for each unit.
- Activity benefits will be monitored by DoF and lessons learned will be documented.

2b.5.5 Support to Mobile Fish Small Scale Vending Unit

Fish vendors play an important role in fish marketing. The project will support in providing mobile fish vending units (two-wheeler) with icebox to members FPG. Fishers will be trained in hygienic handling of fish before they are allotted with the units. The material will be procured at the district level, following procurement guidelines.

Beneficiaries will be selected based on criteria fixed by the Dept. such as:

- Persons availed of similar benefit earlier under any other scheme will be excluded.
- Beneficiaries will contribute 40% (tentative estimate cost)of the unit cost.
- Project support will be one-time grant.
- Project support will be one time for each unit.
- Activity benefits will be monitored by DoF and lessons learned will be documented.
- Activity benefits will be monitored and learning lessons will be documented.

2b.5.6 Establishing Ice Plants

With rising temperatures, increased fish production and bulk harvesting from reservoirs, there will be a rise in demand for ice. Establishment of ice plants will be an important intervention to reduce post-harvest loss. This will also help in retaining the freshness of the catch and will prevent it from spoilage during transportation to long distances. The project will support to establish ice plants in suitable locations, based on the feasibility assessment. Project will support to FPGs or members of FPGs in establishing ice plants. . Beneficiaries will be selected on well defined criteria such as:

- The beneficiary will submit a bankable business plan to avail project support.
- Beneficiaries will contribute 40% (tentative cost)of the unit cost.
- An agreement will be signed with the beneficiary to cater to the need of fishers of the project area on priority basis.
- Project support will be one time for each unit.
- Ice plant will be established by the beneficiary.
- Activity benefits will be monitored and learning lessons will be documented.

2b.5.7 Online Fish Marketing

This is aimed at addressing some of the fish marketing challenges such as timely delivery of quality fish for domestic consumption, improving accessibility of ready to eat and ready to cook fish products and better farm gate price realization. The online fish marketing website and its associated application combined with home delivery will open new avenues for farmers, traders and customers.

FPGs from project and other private entrepreneurs can utilize the system developed under the project. DoF in association with the PMU will develop the required software system which will enable both consumers and fish traders including FPGs and intermediaries to sell and buy fish and fish products. Tie-ups with existing online private sector players that sell fish and related products will also be considered.

2B.6 Capacity Building

2b.6.1 Build institutional capacity & Development-Research Linkage

Development – research linkage is highly desirable for technical strengthening of extension agencies and also for maintaining its technical orientation. At this stage there is a critical need for transfer of technologies from line ICAR institutes like CIFA, NBFGR, CIFT and CIFRI by organizing pilot scale demonstrations of improved technologies and resource

management practices in a collaborative mode. Such a program would also forge a strong bond between research institutes and the stakeholders, helping them in the implementation of human capacity building and training programs.

Linkage with the Fisheries colleges of the state and fisheries colleges under ND Agriculture university, Ayodhya and central agriculture university, Jhansi would be mutually beneficial for the institutions and the project. As the project will require a large number of skilled technicians to run hatcheries, feed plants, processing plants, aquaculture farms etc., the strengthening of these two fisheries colleges is required to meet these human resource requirements.

2b.6.2 Training and Capacity Building

Fish Farmers

In spite of having enormous fisheries potential and a broad scope of fisheries in Uttar Pradesh, the state is lagging behind in aquaculture and inland fisheries because of its low fish productivity, mainly because of the use of age-old aquaculture and fisheries technologies. There are several factors that contribute to the low fish productivity: the poor socio-economic condition of the fisher community, a lack of awareness and less exposure to the latest technologies, and the poor access of fishers and fish farmers to relevant modern scientific technology. These are prominent factors that bar fishers from switching from traditional fish farming to new-age fisheries technology. DoF, UP, and its associated 02 organizations have very fragile manpower, and the concern is that field staff are unable to deliver quality services to the farmers because they don't have enough exposure to the latest fisheries technology and are not being provided with orientation and refresher courses at definite intervals, which affects the process of their skill development.

Training and exposure of base-line fish farmers play a vital role in capacity building and human development to make the state self-sufficient in fish production. Capacity development of the field personnel, the service-providing agency, and the primary producers of the sector—farmers and fishermen—is also important in order to achieve the goal. There is a greater recognition of the importance of participation by fishing communities and resource users themselves in the management of resources through co-management approaches. This requires that fishing communities acquire new levels of capacity to meaningfully participate in such a management process and define management objectives as well as how these objectives might be achieved.

The state is poor in respect of infrastructure facilities dedicated to offering different fisheries training courses, and whatever existing infrastructure is available is either poorly developed or in a dilapidated stage and remains defunct. The DoF, UP, runs a **state-level "Eklavya Fisheries Training and Research Centre Lucknow"** at Vikalp Khand, Gomti Nagar, Lucknow, to impart training and refresher courses on various aspects of aquaculture and fisheries. It was established under the Rastriya Krishi Vikas Yojana (RKVY) in 2010–11 and

organizes and offers different training courses with the technical support of ICAR and NFDB. This is a purely state-owned center with day boarding and residential training facilities for a maximum of 36 people, a guest house, and a state-level laboratory. Besides, some basic infrastructure for fish farmer training is also being provided by the UP-Fisheries Development Corporation at its Gomati Hatchery in Lucknow Center and the UP Fisheries Cooperative Federation in Lucknow. The project will also utilize these facilities for theoretical and practical training.

there are two regional fisheries centres located at Gujartal Jaunpur, Samogara in Mirzapur, and one Matsya Chetana Kendra in Jhansi, which fall under the strategic project area of 28 districts with very limited amenities and almost remain in a nonfunctional state and require renovation and modification to take their services to the desired extent.

To break the ice and encourage the fish farmers to switch over from the old-age legacy of aquaculture practices to a modern scientific approach, the **UP-AGREES** proposes to strengthen human capacity building and skill development by organizing trainings on various customized courses and exposure visits by involving technical partners like ICAR, NFDB, and other reputed national and international organizations. It is proposed to conduct two kinds of training courses. The first kind of proposed training will be dedicated to base-line fish farmers, which will include elementary objectives to gain a better understanding of the basics of aquaculture and fisheries. The second kind of training course will emphasize customized trainings with specialized subjects for selected lead farmers and field functionaries to boost their ability and strengthen them to act as Training of Trainers (ToTs), who will share their knowledge and deliver their skill efficiency to their respective FPGs within their ambient areas.

The proposed targeted baseline fisher groups are largely comprised of leaseholders of community ponds, and the majority of fish farmers and fishermen have small landholdings or are landless workers who are dependent on different rural economic activities for their subsistence, whenever and whichever they get the opportunity to gain. Approximately more than 50 percent of the population of fishermen resides in strategic areas of the project. Reservoirs are distantly placed in remote areas as well, and FPG members would not attend if training camps were organized beyond their ambient reach. The turnout percentage of participants for training camps would be low if training camps were organized in too distant places. It is an established fact that they generally prefer to participate in training camps that are organized in the vicinity of their home place.

It is proposed that the training of base-line farmers be conducted at sites near their home places. This requires a well-versed and sound technical faculty with established training centers and related amenities. The magnitude of onsite training camps will be higher and organized with the technical expertise of external knowledge partners, fisheries colleges of localized agriculture universities, and lead fish farmers who will work to propagate the

technical supports and hand holding of base line fishermen. The customized and specialized trainings for field functionaries and lead farmers focusing on various technical aspects will be conducted at various premium fisheries organizations spanning across India apart oversea training and exposures of officials and lead farmers.

The project will use the infrastructure facilities developed by the DoF-UP, UP Fisheries Development Corporation, UP Fisheries Development Federation in Lucknow and other training institutes of other departments/organizations in UP for training purposes. The state-level Eklavya Fisheries Training and Research Centre Lucknow has boarding and lodging facilities that will be used for customized training courses for lead and progressive fish farmers. The project will judiciously provide financial assistance to the DoF, UP, Fisheries Development Corporation, and Cooperative Federation for the upkeep of their training infrastructures and administrative expenses incurred on training expenses. In the case of customized or regular trainings, the development of demonstration sites, and related hand holdings to be rendered by the technical partner agencies, it will be funded to the respective agencies as per the World Bank procurement rules under the project.

The project will facilitate training to 6800 selected base line fish farmers and FPGs members and the estimated expenditure to be incurred is Rs 489.60 lakhs including administrative expenses as shown in the table given below;

Table 53: Funds required for training fish farmers

Funds required for training package of 6800 base line fish farmers.					
Year	**Unit Cost/ Trainee in Rs**	**No. of Trainees**	**Cost of Training in Rs Lakhs**	**Administrative Expenses @ 20% in Rs lakh**	**Funds required in Rs Lakhs**
2026	6000	1200	72	14.40	86.40
2027	6000	2800	168	33.60	201.60
2028	6000	2800	168	33.60	201.60
Total		**6800**	**408**	**81.60**	**489.60**

Strengthen Extension Services

The primary producers of the fisheries sector, fishers and fish farmers are resource limited and hardly have any access to fisheries / aquaculture extension services. Any further development in this sector in UP will require sound technological back up. The situation thus calls for a dedicated, efficient and easily accessible extension services system. This would help the fishers and farmers in acquiring and applying the necessary knowledge and skills of new technologies and about sustainable management of resources.

It is necessary to provide two-pronged extension services –

- one for harnessing the potential of CPR based open water capture or culture-based fisheries and
- second for farming of fish in privately owned resources like ponds and tanks which involve two different resource user groups (fishers and farmers).

In addition to this the extension system also needs to provide a bundle of other services ranging from technical training and advisory support, assisting in mobilization of critical inputs, facilitating access to institutional credit, delivery of incentives, market facilitation, and conflict resolution instead of just conventional transfer of technology approach.

A special focus on human capacity development is particularly important partly because of emerging technologies, new approaches to fisheries management and also because of changes in the national and international development context. Capacity development is required for the personnel of project staff, fishers, farmers and their organizations (Fisheries co-operatives /SHGs). In view of the growing emphasis on human capacity development, training is becoming an important and significant component of most development projects. Training need assessment will be carried out for each specific groups and the detailed requirement will also be worked out based on such an assessment. Accordingly group specific training modules will be developed.

This will involve training for DOF resource persons. Also, training will be given by DOF staff to a variety of stakeholders such as nursery operators, seed traders and farmers and will include exposure visits for farmers. Required skill upgradation and capacity building measures will be undertaken for the department officials and other stakeholders for technology promotion and its adoption of best practices in fishery. The capacity building measures will be taken up separately in phases for different stakeholders with 100% project assistance. Capacity building will involve following activities.

- Assessment of capacity requirement / training need for the different stakeholders.
- Designing skill development trainings / capacity building training based on the identified capacity needs.
- Developing training modules / manuals, involving external resource agencies, if required.
- Piloting of Training modules / manuals and adoption for conducting capacity building trainings.
- Involvement of resource agencies for imparting training / skill development, in case of requirement.
- Encouraging field level training with demonstration / practical learning sessions, apart from in-house classes.
- Organize exposure visit to success practice sites other states or with the state.
- Follow-up and organizing refresher trainings, if so required.
- Reporting and documentation of trainings (reports, photographs and video).
- Monitoring the application of acquired technology / skill / knowledge base.
- Documentation of learning cases (where capacity building measures translated into action).

Moreover, the Fisheries Department will be substantially trained and reinforced which would enable it to extend the tested improved techniques to the other parts of the state.

The weak extension system in the state is due to the lack of a structured training program for staff and farmer/fishers, absence of modern training centers and paucity of updated training curriculum. The state training centre needs to be modernised and an updated curriculum need to be developed. The project will support the establishment of a modern training centre with updated curriculum for the training of staff and fish farmers. The project will also facilitate linkages with other reputed fisheries training institutions including international organisations.

2b.6.3 Overseas COLLABORATION, training AND Exposure Visit

The objective of international collaboration is to introduce and promote suitable technology and aquatic resource management methods available in other countries that are not available within India to sustainably increase fish production and better manage fisheries resources.

The strategy for international collaboration is based on the following criteria.

a. Organizations should offer new technologies suitable to Uttar Pradesh (India) that is not available within the country.
b. Organizations and its activities (technology demonstrations) have to be located in an area/country where climate and ecological conditions of the aquatic resources are similar to Uttar Pradesh/ India.
c. Current political and social situation of the collaborating Government/Country should be in line with Indian Government foreign policy.
d. The collaboration must be in line with the overall objective of the UP-AGREES.
e. Organizations must have a good reputation and proven adequate capacity to train and demonstrate and be mandated for such work.

The Network of Aquaculture Centers in the Asia-Pacific (NACA) was formed by an international treaty titled, "Agreement on the Network of Aquaculture Centers in Asia and the Pacific", signed in Bangkok on 8 January 1988. NACA promotes rural development through sustainable aquaculture and aquatic resources management. NACA provides a networking platform for technical cooperation and capacity building between nineteen member states including India, their research centers, and Food and Agriculture Organization of the United Nations, which has an advisory role on the NACA Governing Council. NACA will be considered as one of the key collaborators of UP-AGREES.

Other important organization considered for international collaboration is Asian Institute of Technology, Thailand. Founded in 1959, AIT possesses a global reputation. AIT's internationally recognized engineering, environment, and management graduates are highly sought after by employers in their home country and elsewhere. UP-AGREES will consider AIT for capacity building/training of DoF staff.

Vietnam has achieved significant progress in fisheries development during the last two decades. UP-AGREES will collaborate with fast developing Vietnam, which is a friendly country to India. Research Institute for Aquaculture No 1(RIA No.1), is a government organization under the Fisheries Ministry of Vietnam. RIA No.1 is a trailblazer for the aquatic breed industry. RIA No. 1 deals with research, education, and extension in aquaculture and aquatic resources management. The Institute also plays an advisory role for many other aquaculture development projects.

Exposure visits will be organized for the technical staff to best practice sites at the international level. This will help them in understanding the best practices adopted by fish farmers in different areas, getting a perspective of the problems faced in those areas and how to tackle them. This exposure will help in acquiring a knowledge base and replicating it in their locality, based on contextual relevance. Exposure visits will be organized in a phased manner to different overseas locations.

2B.7 Quality Control and Food Safety

Fish is a highly perishable food commodity and requires immediate management for its preservation in order to maintain its shelf life for human consumption. Fish starts deteriorating fast after its catch with a rise in temperature. It is assumed that the fish quality becomes degraded after 30 minutes when fresh fish is kept outside its culture medium (Water) above 30degree Celsius temperature/stress condition without any preservation like icing or cold room owing to microbial attack and secondary infections. **It is estimated that approximately 25 percent of catch of fish stock is usually spoiled** due to microbial attack and secondary infections causing heavy financial damage to fish farmers and fishers. Process of fish putrefaction initiates due to autolytic enzymatic spoilage, oxidative spoilage and microbial spoilage. **Use of antibiotics and contamination of culture medium with heavy metals and pesticides are also detrimental to fish, as it gets accumulated in liver and muscles and may cause food poisoning to the consumer even after its intake as cooked food.**

The Department of Food Safety and Drug Administration, UP, is specifically entrusted with inspecting the quality and food safety standards of food commodities and is authorized to exercise enforcement in accordance with the relevant legal framework. In town areas and cities, the concerned municipal bodies are responsible for controlling food adulteration and food safety as well. DoF UP, has neither a mandate nor is it empowered to take action. Hence, it has no technical expertise. It is a quite new subject and requires the specific intervention of ICAR-CIFT (Central Institute of Fisheries Technology, Kochi), which has expertise for this. It is already proposed to take their services under the umbrella of external partner agencies.

Post harvest hygienic handling of fish with efficient cool chains and storage with ambient temperature are essential for enhancement of shelf life and providing quality fish to consumers. Fishing stations and fish landing centers that play a vital role in ensuring safe landing, berthing and allied activities as well as institutional arrangement for development and management are some thrust areas that need to be addressed. Modern fish markets, processing units, value addition, transportation, branding, niche labelling and traceability in fish from "bait to plate" through creation of fish documentation and network system are essential for ensuring quality and increasing profitability in the post-harvest operations and for improvement of the overall efficiency of the value chain. Further, it is essential to benchmark with global best practices. Strategy and action plan with specific measures for promotion of fish consumption in domestic markets requires focused attention.

Though, there is no specific protocol followed in aqua culture sector for food safety standards either due to it being quite a new concept or low level of its receptiveness attributes to laxed restrictions. No SOP is issued in this regard as well. This will be taken as an innovative activity and for that a token amount of funds is earmarked in the cost tab.

Project will support policy development for fisheries input quality control and domestic food safety standards. Project will make the following provisions to support:(i) development of policy framework, (ii) government staff capacity building; and (iii) establishment of infrastructure such as accredited Laboratory. Project will support the review of existing leasing policy of reservoirs and lakes and in developing a policy framework which will be inclusive, equitable and enables ecosystem-based fisheries resource management including community-based management.

2b.7.1 Safeguard Production Standard and Product Quality

The key objective of this activity is to safeguard the quality standard of fish and fishery products in particular fish farming inputs such as fish seed and feed as wells as ensuring fish food safety in the domestic and international markets. The investments under this area will underpin the activities designed to transform the inland fisheries sector by not only enhancing fish productivity and profitability in a sustainable manner but also ensure production quality and the product accepted by international standards.

The project will invest in strengthening regulatory structures and certification of key fish farming inputs such as fish seed and feed. Although other States introduced regulatory act to have a control on the fish farming input quality, UP government is yet to implement such an act which is vital for regulating the fish seed and feed quality.

Project will extend its support to institutional capacity enhancement for quality control in fish feed and seed certification through strengthening knowledge and skills, as well as strengthening relevant facilities. With the support of technical assistance financed by the project, the Department of Fisheries, Government of Uttar Pradesh will improve training opportunities for stakeholders involved in production technology and for others involved in

fish feed and seed development and sales. The project will also support the feed and seed quality testing laboratory for ensuring quality supply.

2b.7.2 Regulated Decentralization of Input Supply

Regulated decentralization of input supply to enhance accessibility of quality farming inputs is another key activity to be supported. Project will assist in decentralizing the supply of quality fish seed and feed distribution system by supporting public and private small and medium enterprises. This activity is not only aimed at reducing the transportation cost of inputs but will also ensure assured supply of quality input which is vital for successful farming.

2b.7.3 Promotion of Food Safety

It has been recognized that there is an urgent need for the improvement in food safety and quality standards of fish and value-added fish products in the State. The safety measures of fish for human consumption begin once the fish lands on the fishing boat. With aquaculture, it is vital to meet safety standards with the conditions under which the product is farmed (such as water quality). Product safety procedures therefore need to involve fishers, transporters, fish processors, handlers, wholesalers, and retailers.

The project will support food safety, to ensure that all fish and fishery products marketed either for export or domestic consumption satisfy quality requirements cited in Hazard Analysis and Critical Control Point (HACCP) and other protocols. A code of conduct or regulated control scheme is essential with the prime purpose to control, manage, and eliminate, or minimize risk factors including contamination by both microbials and chemicals associated with fish production, processing, storage, transport and sales. All reasonable steps must be taken to prevent the likelihood of fish being or becoming contaminated by both microbials and chemicals during processing, storage, and distribution. Training personnel to enhance performance, to increase technical knowledge and to develop skills in matters related to food quality will be one of the key activities implemented under this activity.

Further, development of a traceability system will be looked into, to identify the sources of contaminants/ banned antibiotics and other chemicals used for fish farming and fish processing times to take lawful and corrective measures to improve/ratify them.

Sustainability

The project will seriously work to ensure the sustainability of the activities of stakeholder groups through handholding, training, and interaction with them on a periodic basis throughout the project period, as well as by addressing their issues and providing a way forward. Technical support will be provided through lead fish farmers, and scientific interfaces will be done through external partner agencies and field functionaries. The most important aspect of sustainability is financing. That support will be given to fish farmers

through the Fish Farmers KCC, up to Rs 1.60 lakh to each needy fish farmer without collateral guarantee. This is a common requirement for agriculture and fisheries activities and is directly associated with the subcomponent 3B Agri Finance ecosystem, which is meant to support fishers and farmers as well. Institutional financing will be done in accordance with the RBI's Guidelines issued in 2019 for KCC admissible to fishermen and fish farmers through the coordinated efforts of UPAGREES, NABARD, and lead banks. DPIUs will undertake this by creating awareness and sensitization among the beneficiaries.

Implementation Model

The project will work with reservoir fishers, fish farmers, fish processors, and fish traders. The sub-component activities will be implemented through the teams as per the organogram[28] below:

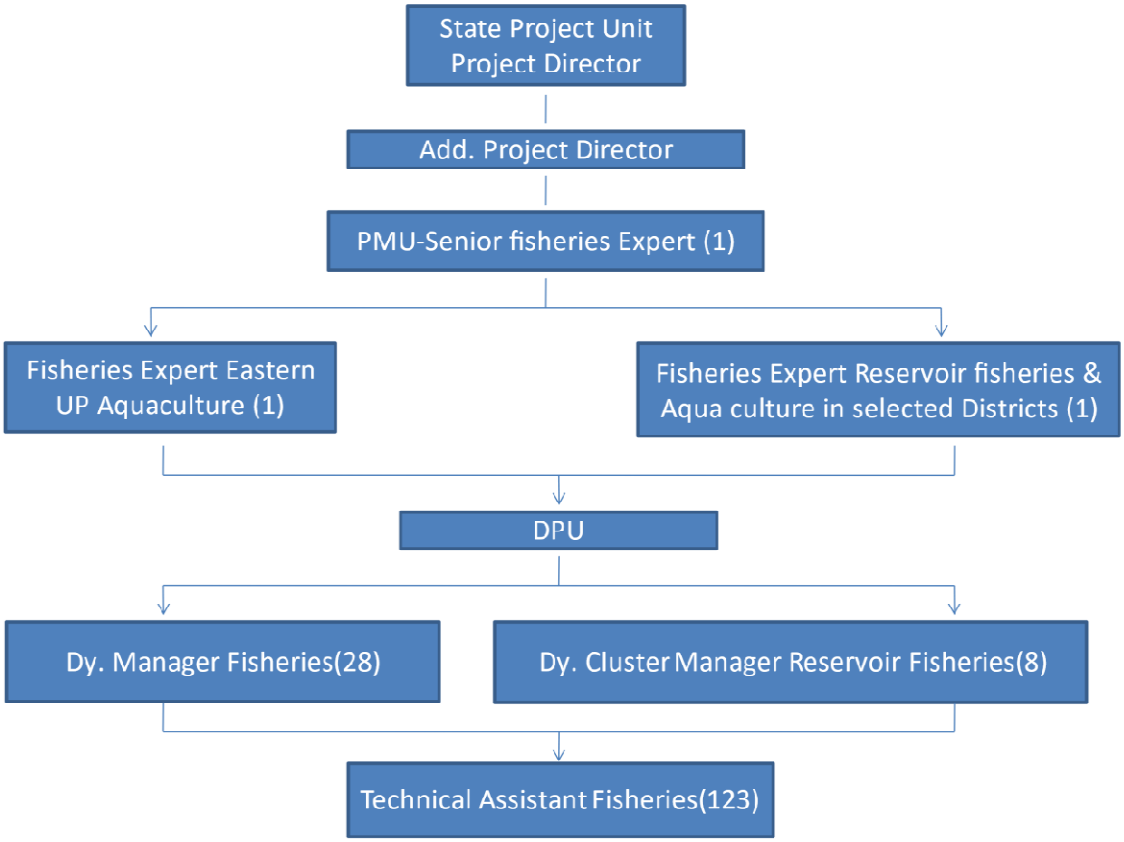


Figure 27: Fisheries Implementation Organogram

The project will utilize existing resources, such as the aquaculture toolkit, developed by the World Bank, FAO Technical Assistance, World Committee on Food Security Guidelines for sustainable fisheries development by High level Panel of Experts (HLPE), and work with premier National Fisheries Research and Development Institutions under Indian Council of Agricultural Research (ICAR) in cooperation with local Agricultural Universities to fill the gap in aquaculture and fisheries management technologies in UP.

[28] The proposed number of manpower in DPU structure may be reduced with engagement of Support Orgnisation.

Civil work is one of the major interventions under the project which includes establishment of two new fish markets one each in Jhansi and Gorakhpur clusters. Similarly, the establishment of brood bank and satellite seed banks of improved germ plasm at fish hatcheries run by UP Fisheries Development Corporation, landing centres at different sites of reservoirs, ice plants will all necessitate civil works. Capacity and efficiency of training centres of DoF will also be under taken to strengthen and modernize them which requires civil works requisite for repairs, renovation and extension of facilities for seamless organization of training camps for different cadres.

These activities will be carried out by hiring a Project Management Consultant (PMC) who will prepare Detailed Project Reports (DPR) for proposed civil works and also oversee , monitor and evaluate the progress of works from time to time. The PMC will work in coordinated way with relevant organizations who in turn will assist PMC for its smooth functioning.

Support from technical institutions

The DoF will be ably supported by State and Central agricultural universities and Indian Council of Agricultural Research Institutes namely, Central Inland Fisheries Research Institute (CIFRI), Central Institute of Freshwater Aquaculture (CIFA), Central Institute of Fisheries Technology (CIFT) and National Bureau of Fisheries Genetic Resources (NBFGR) with clearly defined roles for the effective execution of the project as highlighted below:

Role of Supportive Organizations and Operational Procedures

The ICAR Institutions will deliver technology diffusion by undertaking the following activities:

a. Demonstration of production models: These demonstrations will be held in real farms or waterbodies with full participation of farmers/fishers and extension officers.
b. Training the DoF staff and progressive farmers: Institutions will develop tailored curriculum suitable for implementing UP-AGREES project activities. Training will be conducted both in ICAR facilities and in field (real farm/ water bodies within the project area).
c. Technical backstopping: Extension officers and farmers will be supported by ICAR institutions in terms of addressing any technical and related operational issues.
d. Act as members of technical advisory committees: A Technical Advisory Committee Chaired by the Project Director will review the technical matters and guide the implementation team. The TAC committee consists of representatives from ICAR institutions, and local Universities.
e. Provide latest technological inputs: These organizations will provide technical inputs for designing infrastructure facilities such as modernizing of new hatcheries, post-

harvest management facilities (landing centers, processing units, markets) and training facilities.

Specific activities of ICAR institutions

Central Inland Freshwater Research Institute (CIFRI) is proposed mainly to undertake integrated reservoir development operation through in-situ culture of fish seed to increase fish production and productivity through installing pen and cages in selected reservoirs fall under the project area which will boost the economic activities based on culture cum capture basis. CIFRI will play a major role in demonstrating ecosystem-based production models in reservoirs and will train departmental staff and lead fish farmers/fishers.

Central Fresh Water Aqua culture (CIFA):

CIFA is another premium Research Institute with the mandate to work for enhancing fish production and productivity of shell fish and fin fish through innovations which can be easily adopted by the fish farmers and entrepreneurs for their increased income. CIFA's support will be restricted to small water bodies including minor irrigation/village tanks and ponds. This organization will demonstrate the latest production technologies and train UP DoF staff and lead farmers.

CIFA will work very closely with UPDoF and provide technical support and guidance to:

- modern hatchery and necessary design and construction.
- Pure line breeding program: brood fish management and supply of improved germplasm;
- Formulated fish feed preparation using locally available ingredients including species specific feed; and
- Fish hatchery accreditation and seed certification and work closely with National Bureau of Fish Genetic Resource (NBFGR).
- fish seed and feed accreditation and work closely with NBFGR. NBFGR will collaborate with CIFA in establishing a pure line breeding program: This will include:
    - supply of improved germplasm for candidate species
    - training relevant staff, private hatchers, and nursery farmers; and
    - certification/ accreditation of hatcheries and nurseries

CIFA's support will be restricted to small water bodies including minor irrigation/village tanks and ponds. This organization will demonstrate the latest production technologies and train UP DoF staff and lead farmers.

Any overlap between CIFA and NBFGR should be clarified internally.

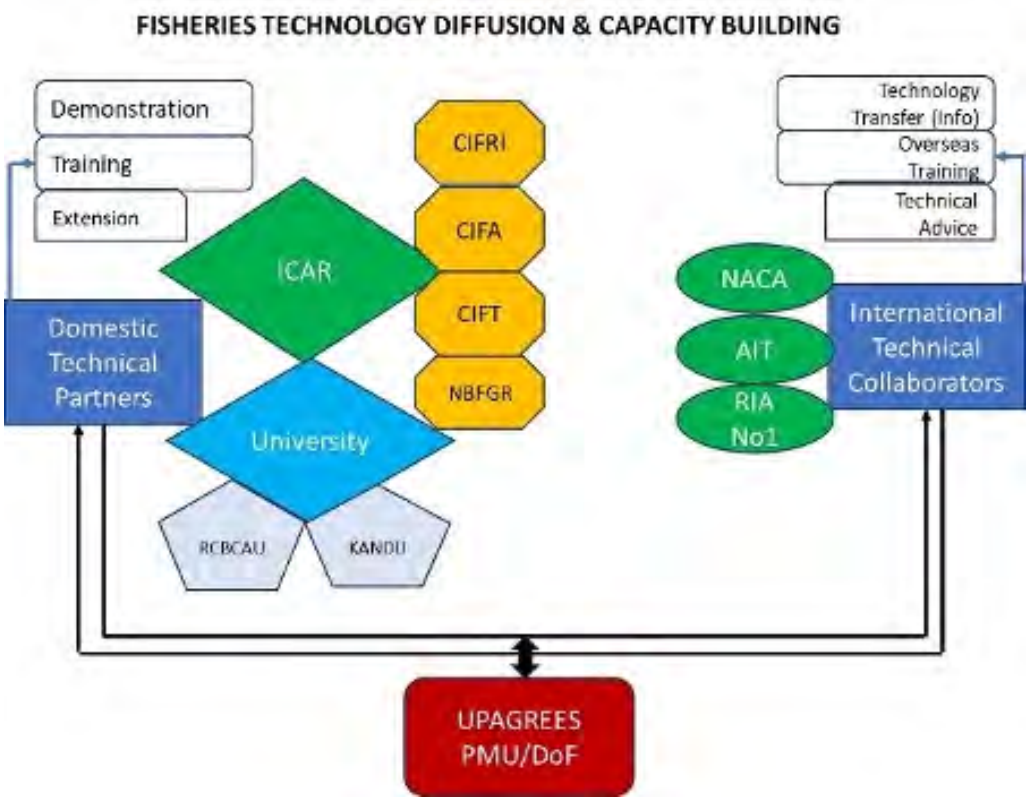


Figure 28: Fisheries technology diffusion and capacity building framework

Central Institute of Fish Technology (CIFT):

A premium research institute with mandate to sustainable harvesting and total utilization of fisheries resource through innovations in harvest and postharvest Technologies, food safety and nutritional security to consumers ensure equitable benefits to the stakeholders across the value chain.

CIFT will contribute to extending improved post-harvest technology including hygienic fish harvest, processing, value adding, storage and transport. This will involve trainer training and stake holder training programs. CIFT will contribute to designing and detailed Project Report (DPR) preparation of modern fish landing centres, fishing gears for reservoirs for effective harvest, fish processing units, fish markets and fish vending units and transportation units.

This project provides an excellent opportunity for transfer of technologies from ICAR institutes by organizing pilot scale demonstrations of improved technologies and resource management practices in collaborative mode.

State and Central Agricultural Universities: College of Fisheries (CoF):

The College of Fisheries will play a major role in training fish farmers in the local language and demonstrating the production and post-harvest technologies. CoF will be instrumental in preparing domestic fish food safety standards and developing protocols for fish disease prevention in freshwater aquaculture.

A large gap exists between the technology available and technology accessible to fish farmers. The component will make provisions to bring together researchers, extension officers and famers to demonstrate innovative fish production models, with a particular focus on inclusion of women farmers. There is a critical need for transfer of technologies from ICAR institutes like CIFA and CIFRI by organizing pilot scale demonstrations of improved technologies and resource management practices in collaborative mode. Under the project, the introduction of technological packages (fish production models) will be carried out in three stages: (i) technology demonstration in farmer's water body (real farming conditions) involving researcher, departmental extension staff and farmer; (ii) farmer adoption trials involving extension staff and farmers; and (iii) wider adoption of technological packages by farmers. To ensure the linkage of research and extension the joint demonstration activities will be properly structured and budgeted.

Project Management Unit (PMU) will engage ICAR consortium on direct contract basis for facilitating partner operational arrangements.

The component will have special focus on strengthening the research-extension linkage. The project will make provisions to bring together researchers, extension officers and farmers to demonstrate innovative fish production models. However, it is important to note that the UP DoF must fill vacant positions in particular project areas for the smooth implementation of this project; Project implementation will suffer without adequate number of skilled staff

Implementation Timeline

Table 54: Fisheries cluster implementation timeline

Sl.	Activities to be Implemented	Year 1				Year 2				Year 3				Year 4				Year 5				Year 6			
1	**Mapping the project boundaries and selection of waterbodies**	■	■	■	■	■																			
2	**Recruitment of project staff & establishment Project Implementation Cell/unit**	■	■	■	■	■																			
3	**Mobilisation of beneficiaries**	■	■	■	■	■																			
4	**Cluster formation**	■	■	■	■	■	■	■	■	■	■	■	■												
5	**Cluster implementation plan**	■	■	■	■	■	■	■	■	■	■	■	■												
6	**Capacity building**	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■								
7	**Training of staff & farmers**	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■								
A	**Civil works**																								
	Modernisation of fish markets/new markets Gorakhpur, Jhansi					■	■	■	■	■	■	■	■												
	Modernising government hatcheries					■	■	■	■	■	■	■	■												
	Upgradation of existing (quality testing) labs/Lab equipment					■	■	■	■	■	■	■	■												
	DPR for all civil works					■	■	■	■	■	■	■	■												
	Monitoring and supervision agency (PMC) for civil works					■	■	■	■	■	■	■	■												
B	**Production Enhancement through Commodity clusters**																								
	Community Ponds: - Supply of improved seed and feed (20,000 ha)					■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	Integrated reservoir production (56,202 ha)					■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
C	**Strengthening of Fish Market infrastructures**																								
(i)	**Establishment of modern fish markets**																								
	Mobile Kiosk					■	■	■	■	■	■	■	■	■	■	■	■								
	Fixed kiosk	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■				
	Ice box with 3 wheeler/E-Ricksha	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■				
	Motor cycle with Ice box	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■				
(ii)	**Marketing Infrastructure**																								
	In store promotion activity in domestic markets					■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■				
	In store promotion for potential export markets, in conjunction with exporters					■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■				

Sl.	Activities to be Implemented	Year 1				Year 2				Year 3				Year 4				Year 5				Year 6			
	ICT activities for establishing Market System including online marketing																								
	Survey/ Analysis: Comprehensive value chain and market analysis																								
D	**Fisheries Enterprise development**																								
	Support for mini fish processing SMEs/Pos (aquaculture related only)																								
	Fish feed production unit (8t/day)																								
	Fresh Fish transportation - insulated van (short distance)/Aquaculture																								
	Fresh Fish seed and live fish transport van (short distance)/Aquaculture																								
	Support for Ice production Units (10t/day)																								
	Mini fish hatchery																								
	Nursery enterprises																								
	Aquaculture hub and ecopark																								
E	**Capacity building, training and facilitation services**																								
	Study Tours and training: National level																								
	Study Tours and training: International level																								
	Mobilization assistance for FPGs																								
	Soil and Water analysis of aqua ponds																								
	Training package of base line fish farmers																								
F	**Technology diffusion**																								
	Demonstration of farming practice/technology 0.5 h/unit-Fisheries estate/private ponds																								
	Mechanization (Aerators and Pumps) solar-based (for demo in village ponds)																								
	Pureline breed (line development)																								
	Biofloc																								
	Recirculating aquaculture system (RAS)																								
	Pen culture																								
G	**Supporting agencies consulting and technology diffusion**																								
	Partnership with External Knowledge partners /ICAR, CA and SA universities																								
H	**Innovations in Fisheries**																								
	Action Pilots/Innovations																								

Key Outputs

To increase production in the initial phase, the project will finance reservoir fisheries through ecosystem-based development in over 56201 ha (water area) of 37 reservoirs, produce seed and marketable fish in 20,000 ha (water area) of village ponds, and demonstrate climate smart and innovative fish culture in about 525 ha of ponds in project areas. Project will also finance construction of new hatcheries and nurseries to increase fingerling production by 300 million.

- The expected annual incremental production from the reservoirs at full development is estimated to increase from about 1405t (@ 25kg/ha) to 5602. 1t fish(@100kg/ha) valued at Rs.67.2cr (US$8.1 million) per year, benefiting over 15,000 families of fishers.
- It is expected that production village ponds will increase from about 0.9 lakh t to 1.4 lakh t fish valued at Rs.1680 cr. (US$202.4 million)/year from in project areas will benefit 28000 families.
- Further, production of 300 million fingerlings valued at Rs 90cr. (US$10.6 million) are to be reared in the project areas and elsewhere in the state.

Expected Project Investment Benefits

Project interventions will set new trend in fish farming and fisheries resource management in the State and Nation and create additional benefits in the form of notable improvements in economy, food and nutritional security and emission reduction.

- Project intent is to invest in a total water area of 76201 hectares (reservoirs 56201 ha. + ponds 20,000 ha).
- Establishment of a State of Art World Class Hatchery through private sector.
- As result project is expected to produce 1.75 lakh tonnes of fish (reservoir 5602.1t +ponds 1.46 lakh mt) + 300 million fingerling together valued at Rs.1837.2 cr. (US$221.3 million) per year towards the end of the project.
- Project will also create business activities through postharvest management and marketing. There are also additional commercial opportunities for auxiliary industries such as net, boat, cage and feed making units. A proper value can be estimated after the detailed value chain study.
- Project interventions will directly benefit 93,000 families (15,000 from reservoir + 28000 from ponds + 50,000 from postharvest and marketing).
- The estimated net return of the project, based on expected direct impact (excluding existing production without project) will be Rs.740,4cr (US$89,2 million) per year.

Risks and Mitigation

The Project design aligns with the Government's development vision and strategies in fisheries development with a focus on production enhancement and strengthening of fish value chains; it is based on the development needs and priorities that related to stakeholders and beneficiaries identified and proposed. Risks associated to the Project should therefore relate to the uncertainties caused by the climate changes, and the fast-changing socio-economic environment, or being of operational nature mostly. Several risk factors have been reviewed in accordance to their coherence to the Project. Some of them are closely associated to the project implementation, others more on a continued basis, as shown in the following table:

Table 55: Risks and mitigation for fisheries cluster

Risks and mitigation measures by project fisheries component interventions				
#	**Risks**	**Risk level before mitigation**	**Risk reduction approach**	**Residual risk level**
1	Lack of relevant skills in potential implementing agencies' staff at district and village levels	Medium to High	Capacity building provided at start-up and continuously	Low
2	Farmer groups fail to be transformed into FIGs/FPOs	Medium	Capacity building to strengthen group operational and service functions	Medium to low
3	Institutional fisheries service providers fail to deliver desired quality.	Medium to low	Targeting of high-end institutional providers (IACR & Uni). Trust and rapport building behaviors established.	Low
4	Existing fish traders and market intermediaries undermine FIGs/FPOs/	High to medium	Pursuing them to explain the benefits from creating vertical integrations towards gaining win-win situation among the vale chain actors.	Medium to low
5	Multi-stakeholder fisheries cluster platforms fail to engage all parties	Medium to low	Capacity building programs Social contracts/obligations to deliver. Employment for facilitators to liaise with all stakeholders	Low
6	Lack of coherence among the subsectors (capture and culture) in selection of sites of interventions	Medium	Strong coordination capacity and leadership in the project Director, and the steering committee; Project's Technical advisory committee (TA) for process and technically	low

			backstopping	
7	Delay in implementation of infrastructure works	Medium to high	Strong monitoring from PMU &PIU adhere to the time line, linkages with local authorities.	Low

Sub-Component 2C: Integrated Agriculture Export Hub:

The objective of this sub-component is to provide technical assistance for the proposed Integrated Agri Export Hub near Jewar Airport, Greater Noida, which is being established to address challenges faced by agriculture exporters and scale up agri-exports from UP. This hub will offer comprehensive services including testing, treatment, packaging, cold storage, and certification. The project will support technical assistance in developing the hub to global standards. With a focus on the high-value commodities emanating from the state (especially including agro-clusters promoted under the component), the project will facilitate linkages to maximize private sector participation to ensure effective export facilitation to key markets such as the US, Middle East, East Asia and Europe.

Component 3: Digital and Financial Ecosystems

Sub-Component 3A: Digital Architecture and Technology Services

Background

Uttar Pradesh's agriculture sector faces multi-dimensional problems & the worst affected are the small and marginal small holder farmers, which form 91% of the farmers in Uttar Pradesh with an average of <1 ha land holdings. The challenges faced by small holder farmers are diverse, complex, and prevalent over all stages across the agriculture value-chain. This includes and is not limited to lack of climate-smart agricultural advice, crop information, market information, access to market linkages, lack of infrastructure such as proper irrigation systems, heavy dependence on rainfall, use of appropriate cultivation practices & crop technology, agricultural inputs supply constraints and lack of access to finance. In addition, dairy, fisheries, and livestock farming sectors have received fragmented support from the government, with very few Government to Citizen (G2C) e-services.

Leveraging recent and ongoing developments in digital technologies have a great transformative potential to catalyse development of sustainable, productive, and resilient farm and food practices. For example - advances in data collection technologies using remote sensors have enabled availability of increased resolution spatial and temporal data for agriculture at a significantly reduced cost of data collection, advances in data processing and artificial intelligence coupled with quantum computing can enable vast amount of data from varied sources to be analysed and used for evidence based policy making, advances in encryption and data protection technologies together with robust interoperability and data sharing strategies can enable an entirely new ecosystem of public and private sector players in developing new and innovative services while preserving confidentiality where necessary, the developments in robotics and drone technology have opened new opportunities to deliver services even in areas which were earlier inaccessible.

These developments (collectively called as Industry 4.0 revolution) provide unprecedented opportunities to usher in Agriculture 3.0 revolution in UP by formulating new digital agriculture policies and building state of the art Digital Agriculture Ecosystem and AgriStack to overcome information gaps/asymmetries and enabling multiple agencies to work together in a Whole of Government (WoG) concept. Digital technologies could provide benefits in terms of delivery of services to beneficiaries, improving collaboration with other departments and organizations, enhancing communication with beneficiaries, and facilitating 24/7 connect with the citizens and delivery of services on anytime anywhere basis.

As a major intervention, the UP-AGREES project aims to support the adoption of digital by default and cloud-first strategies to support the Uttar Pradesh government in designing, developing, and maintaining a state-of-the-art digital agriculture ecosystem across the

entire state. This aligns with the Government of India's flagship programs: IndEA (India Enterprise Architecture), IDEA (India Digital Ecosystem for Agriculture), and Agristack development, and is in line with the Principles for Digital Development. The goal is to integrate Agristack applications as a shared public resource (Digital Public Infrastructure), providing tailored services for smallholder farmers, women, and youth. This will also create opportunities for new jobs and support Agritech entrepreneurs in the state to develop innovative solutions for sectoral problems. The digital architecture and service delivery platforms are envisioned to strengthen the existing service delivery ecosystem and cater to the unique needs of the farmers, the department of agriculture, and allied departments.

Leveraging the combination of Industry 4.0 and Agriculture Revolution 3.0 technologies, such as Big Data Analytics integrated with AI-based decision support tools, a Smart MIS system, and a unified service delivery platform based on the Whole of Government Concept, the proposed services will be data-driven. Real-time and linked spatial and non-spatial data will ensure that quality information is available to all stakeholders in near real time, with dashboard-based decision support tools for action. The interventions seek to reuse and improve existing systems rather than reinventing them, and will be fully compliant with privacy and security guidelines enumerated by central and state government. Careful consideration will be given to data collection, acquisition, use, storage, and sharing. The digital agriculture ecosystem and service delivery tools will be developed based on collaboration and co-creation principles, creating new Digital Public Infrastructure and using existing ones such as India Stack and IDEA. This approach of sharing information, insights, strategies, and resources across organizations and sectors will lead to increased efficiency and impact, setting the foundation for a successful and sustainable digital agriculture ecosystem in the state of Uttar Pradesh.

The project will harness forward-looking Industry 4.0 technologies and integrate state-of-the-art technologies like AI, big data analytics, IoT, GIS, and drone technology to pioneer an Agriculture 3.0 revolution in Uttar Pradesh.

Objectives

The objective of the sub-component is to establish a state-wide digital agriculture ecosystem, support the Department of Agriculture with digital technologies, and develop data-sharing protocols for real-time decision making for all stakeholders.

The project will provide technical assistance to the GoUP for developing a comprehensive digital agriculture policy and contribute to the global repository of Digital Public Infrastructure (DPI). For the applications that require collection and use of personal data of stakeholders, the project will ensure compliance with Digital Personal Data Protection Act 2023 and Electronic Consent Management Framework. Specifically, the sub-component will finance the following:

- Digital infrastructure and solutions platform including hardware, software, and connectivity solutions necessary for development and deployment of core platform and associated applications including weather monitoring systems, AI-driven analytics, and the digital marketplace.
- Ag-Tech incubation and acceleration to support start-ups and entrepreneurs in developing solutions tailored to address the challenges of the agricultural sector and provide solutions at scale. In partnership with leading institutes (such as IITs), the sub-component will also invest in research and development focusing on innovative agricultural technologies, sustainable practices with focus on climate resilience and emissions reduction, and the customization of global digital agriculture models to state-specific needs.
- Training and capacity building of farmers, government officials, and other stakeholders in the ecosystem to enhance digital literacy and adoption of new technologies. The sub-component will also support the extension of farm advisories through 'phygital model' under sub-component 1C.
- Platforms and services to connect farmers with markets, including digital marketplaces, advisory services, and logistical support to facilitate access to domestic and international markets. The platform will also be linked with commodity exchanges, digital twins of cold storage networks, ONDC enabled e-commerce platforms, and AI based supply chain network applications.
- Monitoring, Learning, and Evaluation system to enable continuous learning and adaptation of strategies based on empirical data.

The proposed integrated digital agriculture ecosystem and service delivery platform is envisaged to break up vertical data silos by creating an integrated data/information management layer, Uttar Pradesh Agriculture Data Exchange to enable seamless sharing of data among various systems to provide a complete picture of what is happening in a defined system. This platform will play an increasingly important role in the emerging agriculture data economy by merging real-time data and historical information from different providers to build on new solutions.

Guiding Principles

The proposed ecosystem will follow the following Design Principles:

Reuse Rather than Re-invent - Development of Digital Public Infrastructure (DPI) for Agriculture and Allied departments to avoid Duplication of Efforts: The UP-AGREES project aims to implement a unified service delivery platform based on the Whole of Government Concept, consolidating various services and information into a single, user-friendly platform. By leveraging open-source solutions, the project will build upon existing platforms and technologies, saving resources and ensuring compatibility with other systems.

Furthermore, the use of open APIs will facilitate data exchange between different systems, enabling seamless integration of various existing electronic service delivery platforms. This approach aligns with global good practices and principles of digital design, setting the foundation for a successful and sustainable digital transformation in Uttar Pradesh's agricultural sector.

Ensuring Interoperability and adherence to Open Standards: Interoperability, facilitated through the use of open standards, is a cornerstone of India Enterprise Architecture (IndEA) guidelines issued by government of India and is crucial for the successful implementation of the proposed digital agriculture ecosystem in Uttar Pradesh. Use of open standards will be mandated under the platform to ensure that different systems can communicate and exchange data seamlessly, enabling a unified and coherent digital environment. This is particularly important in the context of agriculture, where data from various sources - such as weather forecasts, soil health data, market prices, and farmer profiles - need to be integrated for comprehensive decision-making and service delivery.

In the proposed UP-AGREES project, the use of open standards will allow the various components of the digital agriculture ecosystem - including Big Data Analytics, AI-based decision support tools, and the Smart MIS system - to interact and share data effectively. This will not only enhance the functionality and efficiency of each component but also ensure that the overall system is greater than the sum of its parts. By adhering to open standards, the project will also ensure future compatibility with new technologies and systems, making it a sustainable and forward-looking initiative. This approach aligns with the principles of IndEA, which advocates for interoperability and open standards to ensure a robust, flexible, and future-proof digital infrastructure.

Enable Extensibility via Layerability and Modular Design: The proposed digital agriculture ecosystem will be designed to be extensible, meaning it will be capable of incorporating new functionalities and services over time without disrupting existing ones. This will be achieved through layerability and modular design. Layerability refers to the design of the system in layers, where each layer provides services to the layer above it and serves as a client to the layer below. Modular design, on the other hand, involves breaking down a system into smaller parts (modules) that can be independently created and then used in different systems. This approach allows for flexibility, as modules can be added, removed, or updated without affecting the rest of the system. This design principle aligns with the India Enterprise Architecture (IndEA) framework, which advocates for a modular approach to ensure scalability and flexibility.

Allow Configurable Design with Plug-n-Play Capabilities: The systems under the project will be designed in a way that they can be easily configured to meet the specific needs of different users or scenarios. This means that the system will have plug-and-play capabilities, allowing different modules or components to be easily added or removed as

needed. This will not only enhance the flexibility of the systems but also makes them more user-friendly, as users can customize the system to better suit their needs.

Enhance Transparency and Accountability via Open Data and Blockchain-Based Systems: The use of open data and blockchain technology can significantly enhance the transparency and accountability of the digital agriculture ecosystem. Open data allows for the free use, reuse, and redistribution of data, which can foster innovation, collaboration, and public participation. Blockchain technology, on the other hand, provides a decentralized and secure method of recording transactions, which can enhance trust and accountability in the system. These technologies align with the principles of the Digital India initiative, which emphasizes transparency, openness, and accountability in digital governance.

Ensure Inclusive Access via Multiple Delivery Channels: Inclusivity is a key principle of the IndEA framework, and it will be a central consideration in the design of the digital agriculture ecosystem. This means that the system will be accessible via multiple delivery channels, including web, mobile, IVRS, chatbots, and offline modes, to ensure that all users, regardless of their location or technological capabilities, can access the services and information they need.

Design to Scale via Distributed Cloud Computing Infrastructure: The system will be designed to scale efficiently to accommodate growing user demand and data volumes. This can be achieved through distributed cloud computing infrastructure, which involves the use of standard, off-the-shelf hardware components and tools to build highly scalable and cost-effective backend computing systems. This approach allows for easy and cost-effective scaling of the system as needed, ensuring that it can continue to deliver high-quality services even as demand grows.

Data Security and Privacy by Design adhering to the Consent Management Framework of the Government of India: Data security and privacy will be integral to the design of the digital agriculture ecosystem. This means that the system will incorporate robust security measures to protect data from unauthorized access, use, or disclosure. It should also respect users' privacy by collecting and using personal data in a manner that is transparent, fair, and in accordance with the consent management framework of the Government of India. This approach not only protects users' rights but also enhances trust in the system, which is crucial for its success and adoption.

The (UP-AGREES) project digital architecture and technology services component aims to make Uttar Pradesh the first state in the country to implement Full Stack Digital Agriculture Ecosystem and service delivery platform based on Whole of the Government principle. The system will be delivered through multiple interventions as enumerated below:

3A.1 Strengthening and Expanding the Digital and Connectivity Infrastructure

The first activity to be undertaken involves strengthening and expanding the digital and connectivity infrastructure at the Department of Agriculture at the state and district levels. This includes provisioning state-of-the-art conferencing facilities at the State level Project Management Unit (PMU) and district centers, procuring necessary computers and application software for departmental users, and ensuring connectivity options through Statewide Area Network (SWAN) and third-party connectivity providers. Mobile equipment may also be provided for fieldworkers requiring real time updating of data such as crop information, verification of beneficiaries etc. On the backend, the aim is to develop a state-of-the-art cloud infrastructure for the hosting environment including separate servers for spatial and nonspatial data, and other associated applications. This robust infrastructure will ensure that all stakeholders, including farmers, FPOs, and government officials, have access to real-time data and information, thereby facilitating informed decision-making and efficient service delivery.

3A.2 Integrated AgriData Hub with AI Integration

The project envisages the development of an Integrated Agriculture Datahub with AI integration. This digital public infrastructure will serve as a repository of agricultural data, enabling predictive analytics, trend analysis, and data-driven policy formulation. The AI integration will allow for the automation of routine tasks and the generation of actionable insights from the collected data.

The proposed State Agriculture Data Hub and Agristack for Uttar Pradesh will be a comprehensive data platform catering to all requirements of the Agriculture sector. It will be built upon the IDEA architecture for a federated farmers' database, integrating existing datasets from various sources such as the Pardarshi Kisan Sewa Portal, Horticulture Department Portal, Mandi Parishad, and others. These databases will be linked with digitized land records, real-time weather information, and other climate-based datasets available either with the Government of India or private players. The platform will be readily interoperable with the national Agristack and will provide role-based access provisions for real-time data updates.

The Agridatahub is designed to support evidence-based planning through decision support systems, improving the efficiency of the Agriculture sector and aiding in better management of schemes aimed at increasing farmers' income. It will be developed as the core building block for the proposed Digital Agriculture Ecosystem, with linked AI modules for data mining, linking spatial and non-spatial data, and reference applications for providing services to farmers, FPOs, DOA, and other stakeholders.

3a.2.1 Core Building Blocks of UP Agriculture Data Hub

The design and development of the Agridatahub will adhere to the principles of FAIR (Findable, Accessible, Interoperable, and Reusable) at each stage. The building blocks are categorized into three groups:

I) **Core Building Blocks:** These act as the single-source-of-truth at the state level and provide centralized functionality required for interoperability. Examples include the Agri data stack and cloud environment, which will be developed and maintained by the Department of Agriculture in partnership with other allied ministries/departments of the government of Uttar Pradesh.

II) **Common Application Building Blocks:** These are reusable functionalities or applications that ensure uniformity and prevent duplicative development work. Examples include GIS Engine, IoT Engine, Data Analytics Engine, Payment Gateway, UPI, etc. These will be developed and integrated by the selected System Integrator for the platform.

III) **Reference Building Blocks:** These are generic functionalities that can be customized as needed. They will be developed by the DoA and partner ecosystem players, with the code published as open source for integration by the other State government or private sector organizations based on a pre-defined rights-based access mechanisms.

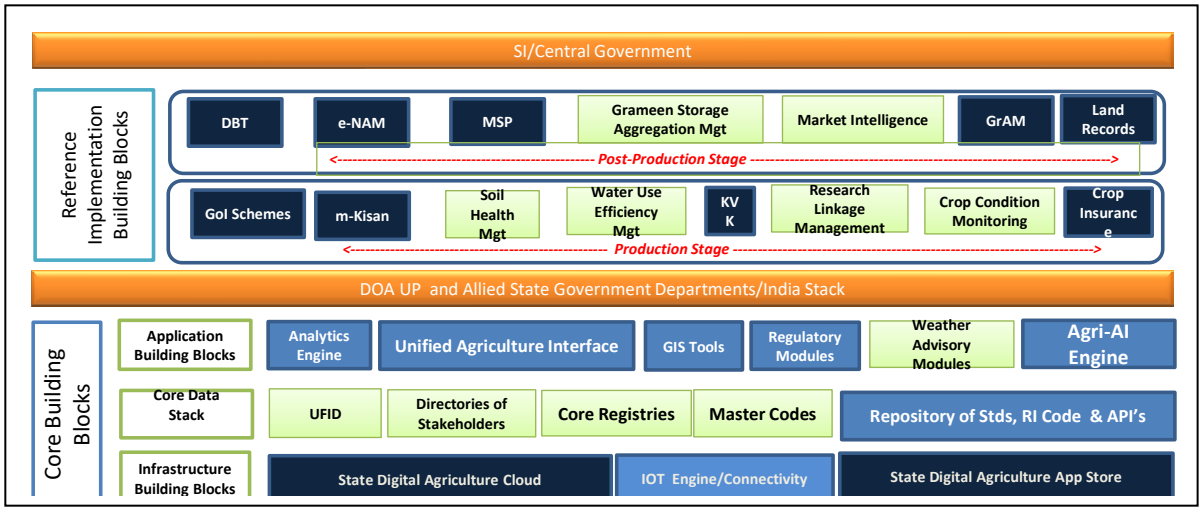


Figure 29: Building Blocks of State Agriculture Data Hub

3a.2.2 Data Stack and Core Datasets

The Agri datahub will leverage India Stack modules (Identity Layer, Payment Layer, Data Layer, and consent management framework). The key databases required for the Development of Agri datahub are:

I) **Farmers' Stack:** This will constitute the farmers' database already available with Pardarshi Kisan Sewa, Revenue Department, Horticulture Department, and other registries used to disburse benefits under state and center-sponsored schemes. A

configurable architecture will be developed for collecting the data from the existing systems database, through APIs and provision for adding additional datasets through a configurable, rights-based access framework.

II) **Farm Stack:** This will constitute Geo-referenced village maps with datasets pertaining to Land Records, Soil Health Records, Irrigation status, associated agriculture activities, water bodies, agriculture department land and other assets, and other geo-referenced datasets as required by DoA and GoI. The module will be configurable to add additional data layers to the base GIS map based on the requirements from time to time.

III) **Crop Stack:** Under the crop stack, the geo-referenced data pertaining to the cultivation of crops, Seeds, Fertilizers, Pesticides, Farm Machinery, and associated datasets will be collected and made available. The module will be configured to collect the data through APIs from state and central government applications where available and append this with additional datasets that will be collected using configurable data collection forms/modules.

The project will start with the datasets that are mandated to be collected under National Agristack initiative of government of India. The number of datasets will significantly increase as the project progresses. Figure below depicts the minimum data that will be collected under various data stacks in the UP state Agriculture Data Hub.

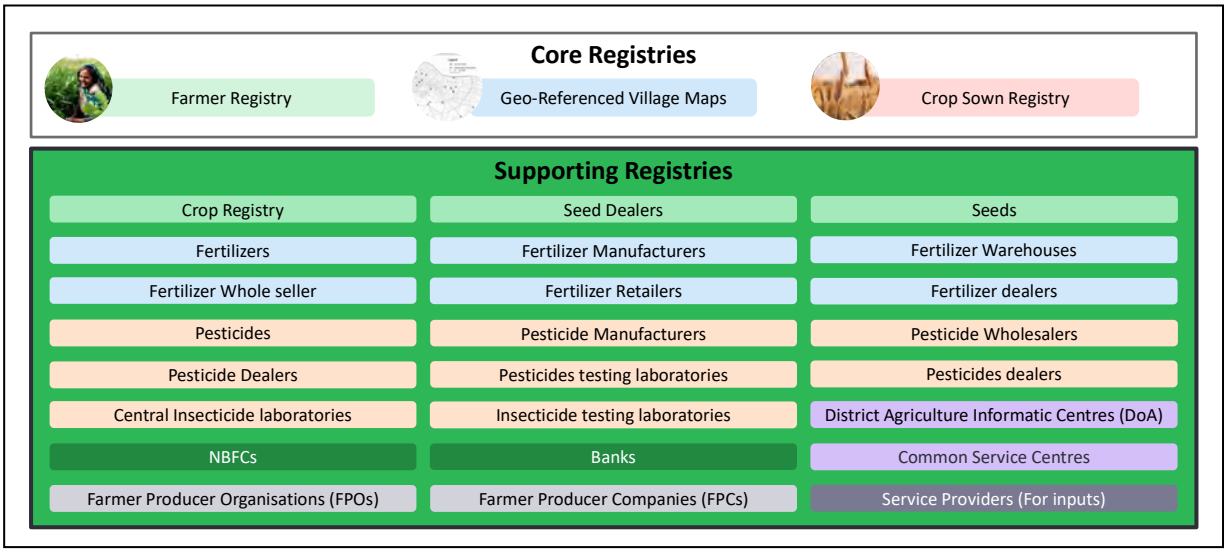


Figure 30: Data Stacks for UP Agriculture Data Hub

The development of the Agri Data Hub will be guided by clear long-term business objectives, ensuring alignment with strategic goals. The selection of data integration tools will take into account the size and complexity of the data, the types of data sources, and the performance and scalability requirements of the system. The platform will be designed for simplicity, allowing non-tech savvy users to quickly get started and debug problems with minimal assistance. Understanding the data sources being integrated, including the data structure, format, quality, and any potential issues or challenges, will be a key focus to

ensure data consistency and reliability. Specific roles and permissions will be assigned to users to streamline coordination and improve overall effectiveness, enhancing the governance of the Agridatahub.

3a.2.3 Functional Modules and Common Applications of Agri Datahub

The functional modules of the Agriculture Data Hub will be designed to cater to a diverse range of stakeholders, including farmers, public institutions, and allied agencies. Each module will be tailored to provide relevant, timely, and actionable information, thereby maximizing the utility and accessibility of the Data Hub. While distinct in their functionalities, these modules will be designed to interoperate seamlessly, ensuring a unified and efficient data flow across the entire Agriculture Data Hub. They will also be configurable and modular, allowing for easy customization and scalability as per the evolving needs of the stakeholders. Provided below is a tentative list of some of the modules that will be part of Agri Data Hub:

I) **Registration module for farmers/Public (Individuals, Groups, Institutions):** An online registration module will be created for collecting data to populate the Farm stack, Farmer stack, and Crop stack. Partial data related to each of these stacks may be readily available with various portals in the state as described in earlier sections and the API gateway with associated tools will pull this data into the registration forms. The data pertaining to other fields will be entered by the respective users based on their authorization levels. Facility for entering profile, land, crop, asset details soil type and soil health, digital elevation model and slope shall be provided as part of registration. Data entry option to submit farm details along with details of allied agencies involved in providing inputs like planting materials, machinery, equipment, fertilizers, PPCs, and credit history shall be provided. Facility for registration shall also be provided to institutions involved in cultivation. To ensure data quality, a mechanism for data validation and error handling will be implemented. Additionally, a feature for data deduplication will be incorporated to avoid redundancy.

II) **Registration Module for Department and Allied agencies:** An online registration facility shall be provided for department users at various levels. The information will be used for the development of HR, Field Force Management, and financial modules for the platform. To ensure data security and privacy, a feature for role-based access control will be implemented.

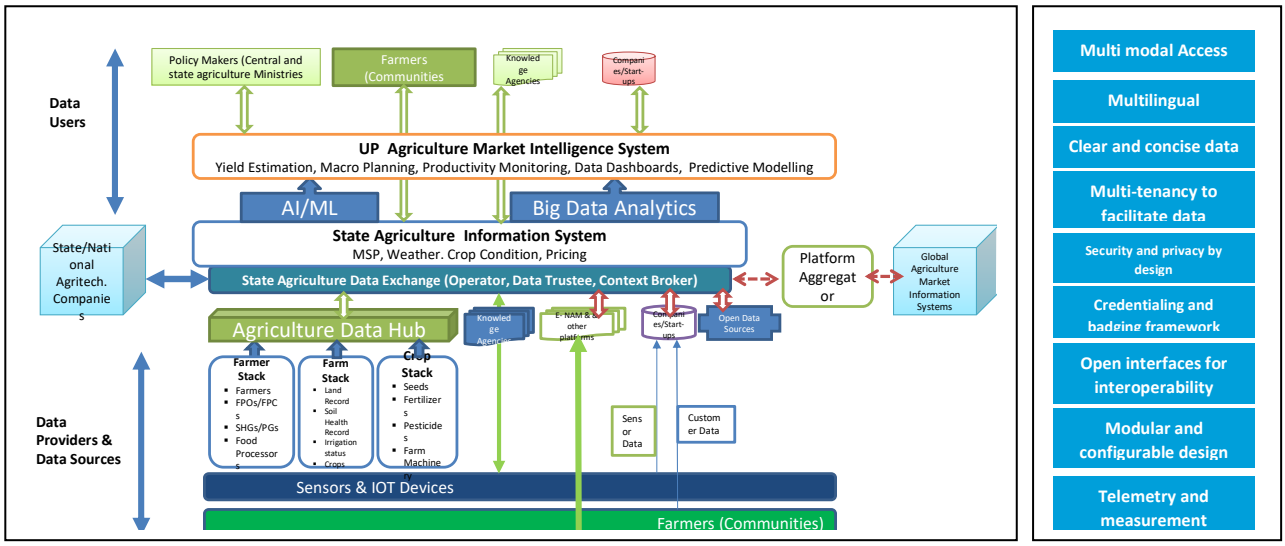
III) **GIS Engine and Asset Mapping Dashboards:** The project aims to include the development of a GIS Engine with linked spatial and nonspatial data as part of the Agri Data Hub. This will enable the mapping of all departmental assets with their real-time status, facilitating efficient resource allocation and management. GIS Engine will core platform to be used as a shared DPI by all allied agencies. To make the data more understandable and actionable, a feature for data visualization will be added. Additionally, a mechanism for real-time updates and tracking of assets will be implemented.

IV) **SMART MIS and Role-Based Dashboards:** A SMART Management Information System (MIS) with role-based dashboards will be implemented for evidence-based decision support. This will allow stakeholders at different levels to access relevant data and insights, promoting transparency and accountability. To cater to the specific needs of different stakeholders, a feature for customizable reports will be incorporated. Additionally, a feature for predictive analytics powered by AI engine will be added to provide insights into future scenarios for decision-making

V) **Farmer/Public Dashboard:** A personalized dashboard for farmers/Public will be developed to provide information to all stakeholders at-a-glance. The main purpose is to communicate information quickly, clearly, and efficiently. The dashboard shall show trends and changes in data over time. The dashboard shall be customizable, drill into detail and have an intuitive data presentation. The dashboard shall display all details for the end users including land, crop, asset, allied activity, etc. To keep the farmers updated about important information, a feature for real-time notifications and alerts through SMS, IVRS and other feasible channels will be added.

The proposed reference architecture of state Agri Data Hub is as provided in the diagram below:

Figure 31: Agriculture of UP Agriculture Data Hub



3A.3 UP Agriculture Services Application Stack

The UP-Agriculture Application Stack will be designed to leverage the foundational modules of the Digital Agriculture Stack, the datasets, and the API gateway to provide a wide array of services to diverse stakeholders. The aim is to create a comprehensive digital ecosystem that caters to the needs of farmers, government agencies, financial institutions, and market entities. The services offered through the platform are organized into several categories, each addressing a specific aspect of the agricultural value chain.

3a.3.1 Agriculture Advisory Services

This category includes applications that provide farmers with crucial information and advisories to enhance their farming practices. Some of the proposed services/applications will include:

- **Weather forecast and Alerts:** Real-time weather updates and alerts to help farmers plan their agricultural activities.
- **Mandi Prices:** Updated information on crop prices in different markets to help farmers make informed selling decisions.
- **Crop Stress and Disease Advisory:** Alerts on potential crop diseases and stress conditions, along with advice on mitigation measures.
- **Precision Agriculture:** Guidance on precision farming techniques to optimize resource use and increase crop yield.

- **Farm Management Practices:** Information on best farming practices tailored to local conditions and crop types.
- **Post-Harvest Management Protocols:** Guidance on post-harvest handling, storage, and processing of crops to reduce losses and maintain quality.
- **Government Schemes and Training Programs:** Information on government schemes and training programs available for farmers

3a.3.2 Finance and Insurance Services

This category includes applications that facilitate access to financial services and insurance for farmers. Services include two types of packages wherein a) UP-AGREES has a more central role in developing and managing technology stack with funding for linking with financial service providers and b) wherein UP-AGREES plays more of a convergence facilitation role as follows:

- **E-Kisan Credit Cards:** Facilitating access to credit for farmers through Kisan Credit Cards with focus on eKCC by proving a common platform and architecture for Banks
- **Microfinance & digital payments Applications:** providing information to Connect farmers with microfinance institutions for small loans and other related institutions and their field network for enabling digital transactions.
- **Warehouse Receipt Financing:** Facilitating loans against warehouse receipts for stored produce.
- **Equipment Finance/Lease:** Providing information and facilitating linkages for agricultural equipment financing.
- **Pledge Loans:** Facilitating loans against pledged agricultural produce.
- **Insurance Applications:** Facilitating linkages for access to crop insurance and livestock insurance.

3a.3.3 Market Linkages

This category includes applications that help farmers connect with markets and enhance their market access. Some of the services that can be provided through Market linkages stack are:

- **Market Intelligence Systems**: Providing insights into market trends and demand patterns.
- **Commodity Exchanges:** Facilitating trade in agricultural commodities.
- **Cold Storage Networks:** Connecting farmers with cold storage facilities.
- **Farm Equipment Lease Applications:** Facilitating leasing of farm equipment.
- **E-Commerce and E-Trading:** Enabling online sale and purchase of agricultural produce.
- **Supply Chain Network Applications:** Facilitating integration into agricultural supply chains.
- **Traceability Solutions and Organic Certifications:** Providing solutions for traceability and organic certification of produce.
- **Carbon Credit Markets:** Facilitating participation in carbon credit markets.

The UP-Agriculture Application Stack will be designed to be modular and interoperable, allowing for the addition of new services and applications as needed. The goal is to create a comprehensive digital ecosystem that caters to the diverse needs of the agricultural sector

and contributes to the overall goal of enhancing agricultural productivity and farmer incomes. It is also envisaged that a multitude of agritech entrepreneurs and large service providers will be able to be onboarded onto the system based on standardized Public Private Partnership models that will be developed during the project implementation. A diagram showing the reference architecture of entire ecosystem along with the application stack is as provided below:

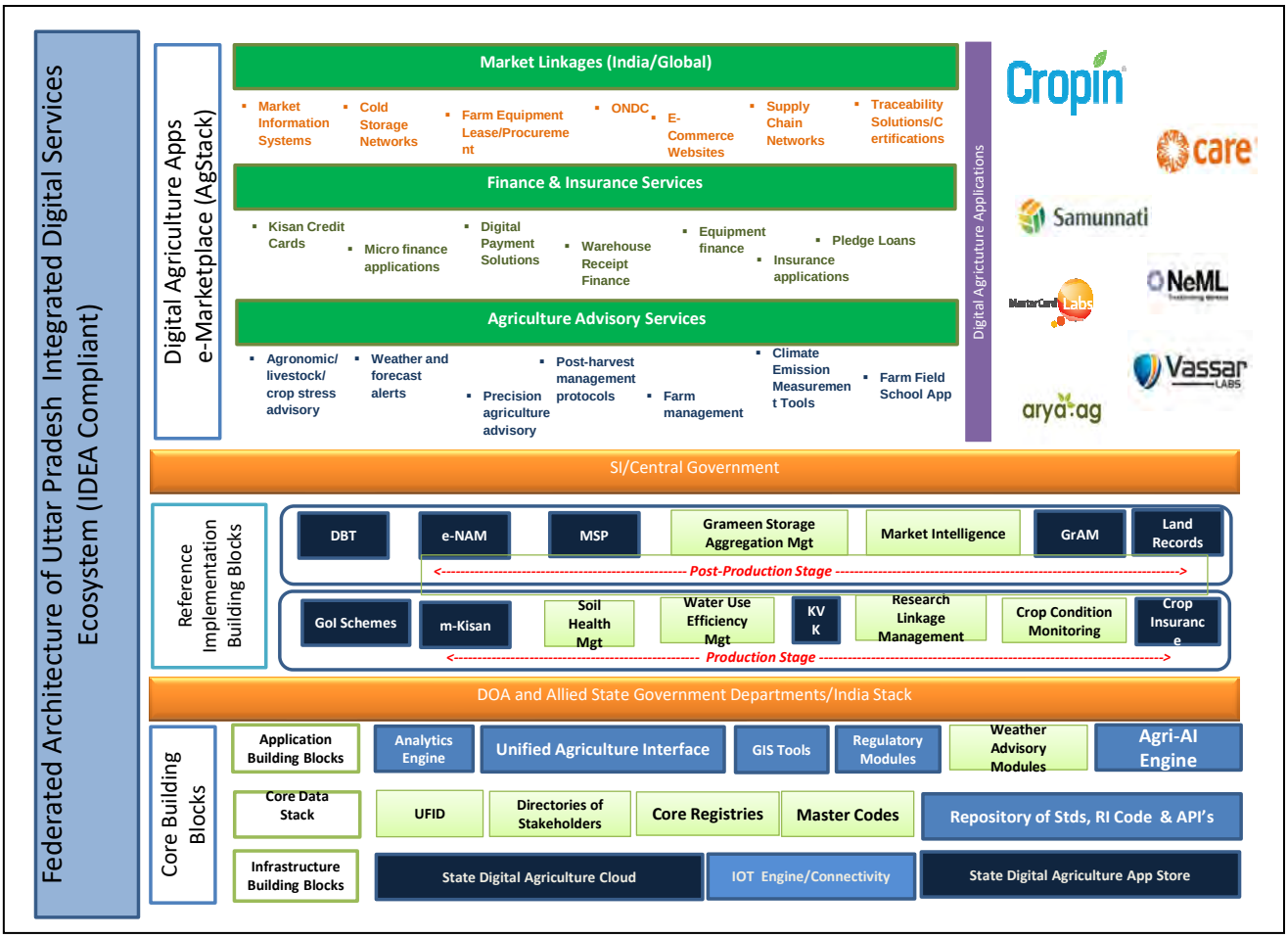


Figure 32: Federated Architecture of UP Agriculture Datahub and Agristack Applications Ecosystem

3A.4 Multi-Channel Farmer Connect System

A multi-channel farmer connect system will be set up for outreach to farmers, FPOs, and all stakeholders. The Farmer Connect System, inspired by successful citizen engagement programs worldwide, aims to foster a collaborative and transparent environment where farmers feel heard, valued, and empowered. By leveraging digital technology and multi-channel communication, it seeks to transform the way the Department of Agriculture interacts with and serves the farming community. The system will leverage multiple channels, including social media, targeted SMS, TV programs, and community dialogues, to ensure effective and efficient communication. The key subcomponents of the farmer connect system are as enumerated below:

- **Multi-Channel Communication Platform:** The department will develop a comprehensive platform that integrates various communication channels such as

social media, SMS, TV programs, and community dialogues. This platform will allow the Department and Minister of Agriculture to disseminate information and engage with farmers effectively.

- **Real-Time Information Dissemination:** The platform will be used to provide regular updates on project activities, policies, and other relevant information. This will keep the farmers informed and involved in the project.
- **Feedback and Grievance Redressal Mechanism:** The project will establish a mechanism within the platform for farmers to raise concerns, provide feedback, and have their grievances addressed promptly. This will help improve the quality of services and ensure farmer satisfaction.
- **Stakeholder Dialogues:** Under the project, regular dialogues will be organized with all stakeholder groups to discuss project progress, challenges, and future plans. This will foster a sense of community and shared ownership among the stakeholders.

3A.5 Capacity Building and Training

The UP-AGREES project, with its ambitious vision of creating a comprehensive digital agriculture ecosystem, necessitates a robust capacity-building plan. This plan is designed to equip the Department of Agriculture (DoA) and all associated stakeholders with the necessary skills and knowledge to effectively utilize and manage the digital tools and services provided by the project. The capacity-building plan will span the entire six-year duration of the project, ensuring continuous learning and development.

3a.5.1 Technical Skills Development

The first pillar of our capacity-building plan focuses on enhancing the technical proficiency of the DoA staff at all levels. This will involve:

- **Data Management Training:** As the project heavily relies on the effective use of data, it is crucial that the staff understand how to manage, analyze, and interpret data. This training will cover topics such as data collection, data cleaning, data analysis, and data visualization.
- **Digital Tools Training:** The staff will be trained on how to use the Agriculture Data Hub, AI-based analytics tools, GIS, and other digital tools that will be part of the digital agriculture ecosystem. The training will be role-specific, ensuring that each staff member is equipped to perform their duties effectively.

3a.5.2 Management Capabilities Enhancement

This subcomponent will focus on strengthening the management capabilities of the DoA staff. This will involve:

- **Project Management Training:** The staff will be trained on project management principles, including planning, execution, monitoring, and evaluation. This will ensure that they can effectively manage the various components of the project.

- **Risk Management Training:** Given the complexity of the project, it is crucial that the staff understand how to identify, assess, and mitigate risks. This training will cover topics such as risk identification, risk assessment, risk mitigation strategies, and risk monitoring.
- **Governance Training:** The staff will be trained on governance principles, ensuring that they understand their roles and responsibilities and can effectively manage the project's stakeholders.

3a.5.3 User Engagement and Digital Literacy

This will focus on enhancing the digital literacy of the diverse user groups, including farmers, FPOs, and other industry stakeholders. This will involve:

- **Digital Literacy Training:** The users will be trained on how to use the digital services offered by the project. This will include training on how to access and navigate the digital platform, how to use the various digital services, and how to protect their digital data. Nyay Panchayat Level Facilitator (GPLF) of Krishi Raftar Kendras (KRKs)[29] will be trained on how to use the different services provided through the platform for further dissemination and facilitation.
- **Stakeholder Engagement Workshops:** Regular workshops will be held to engage with the users, understand their needs and challenges, and gather feedback on the digital services. These workshops will also serve as a platform for the users to share their experiences and learn from each other.

The capacity-building plan will be implemented in a phased manner, starting with an initial training phase at the beginning of the project. This will be followed by refresher training sessions at regular intervals throughout the project's duration. The plan will also include a robust monitoring and evaluation component to assess the effectiveness of the capacity-building activities and make necessary adjustments.

The capacity-building plan draws on global best practices in digital transformation in public service delivery. It incorporates lessons from the competency framework for civil servants on AI and digital transformation developed by UNESCO, as well as capacity-building initiatives undertaken by the World Bank and the Asian Development Bank in the area of digital government transformation. The capacity-building plan will be most critical component of the UP-AGREES project. It aims to ensure that all stakeholders are equipped with the necessary skills and knowledge to effectively utilize and manage the digital agriculture ecosystem. By doing so, the plan will contribute to the project's success and the overall development of the agriculture sector in Uttar Pradesh.

[29] Please see Component 1C: Agri-Extension

Proposed Digital Applications Stack for Project Components

In alignment with the overarching goals of the project, a dedicated application stack will be developed for each of the project components, with AgriData Hub serving as the single source of truth for all data. This approach ensures consistency, accuracy, and real-time access to vital agricultural information. The application stack will leverage common building blocks such as GIS Engine, Data Analytics Engine, and Application Metering Tools, providing a robust and scalable foundation for innovative solutions.

Proposed Applications for Component 1: "Agriculture Productivity through Climate Smart Agriculture System (CSA)"

- *Water Efficiency Management & Irrigation Scheduling Application*: This application will utilize weather forecasts, soil moisture data, and specific crop requirements to optimize irrigation schedules. By tracking water usage and providing actionable recommendations, it aims to enhance water efficiency and reduce wastage. Similar applications have been implemented in regions like California to conserve water in agriculture.
- *Soil Health Analysis Tools*: Integrating soil testing data, this tool will offer personalized fertilizer recommendations, promoting sustainable soil management. It aligns with global initiatives like the Soil Health Card Scheme in India, providing farmers with valuable insights into soil health.
- *Carbon Footprint Calculator*: Designed to monitor and analyze farming practices, this application will estimate and help reduce carbon emissions based on a standard MRV system. It will be interoperable with the Climate Warehouse platform of the World Bank, contributing to global climate goals.
- *Pest Prediction and Control Application*: Leveraging AI and GIS, this application will predict pest infestations and recommend appropriate control measures. Similar systems have been deployed in countries like Australia, providing early warnings and reducing pesticide use.
- *e-Guides for Agronomic Practices*: These digital guides will provide a crop-wise package of practices and guidelines, enhancing farming techniques and productivity. Examples include the FAO's e-Agriculture initiative, offering best practices and expert advice.
- *High-Value Crop Recommendation Tool*: By analyzing market trends and soil conditions, this engine will suggest profitable crop diversification, supporting farmers in making informed decisions.
- *Agriculture Extension Platform*: This platform will strengthen advisory services at district and state levels through digital channels, enhancing outreach and support
- *Market Linkage Application*: Facilitating connections between farmers, FPOs/Clusters, and markets, this application will streamline selling processes, leveraging the Network for Digital Commerce standards.

Proposed Applications for Component 2: Component 2 is designed to foster collaboration, innovation, and efficiency within the agricultural sector. The interventions focus on identifying potential clusters, empowering Farmer Producer Organizations (FPOs), promoting private innovations, and strengthening financial services. The aim is to enhance productivity, competitiveness, and sustainability in agri-business through targeted digital applications. Following applications are proposed to be included in the application stack for component 2:

GIS-based Tool for Cluster Mapping and Identification: This application will utilize GIS and data analytics to identify and form potential clusters, including aqua-culture. By analyzing regional strengths and opportunities, it will facilitate targeted development and collaboration within the agricultural community.

Farmer Producer Organization (FPO) Empowerment Suite: Building on the existing FPO Shakti portal, this suite will support technical assessments and enhance market readiness of FPOs.

Innovation Fund Management Platform: This platform will manage the "Innovation Fund" designated for MSME and Agtech. By promoting private innovations and supporting emerging technologies in agriculture, it will foster creativity and technological advancement within the sector.

Warehouse Receipt System: Enhancing the existing warehouse receipt system (manual), this application will ensure transparency and efficiency in storage and trading. By providing real-time access to storage data and streamlining trading processes, it will contribute to a more robust and responsive agricultural supply chain.

Proposed applications for Component 3.2 – Agri Finance:

Agri Business and Agri Finance Challenge Fund application: this application will be used to invite innovative market based solutions from the industry players and provide them with grant funds for implementing the same. This application with improve, transparency in use of funds, and progress monitoring.

Krishi Raftar Kendra Facilitators: this application will be used to provide training to facilitators and track their activities plus performance

UP Government Readiness Level

The Government of Uttar Pradesh (GoUP) is in a high state of readiness to implement various interventions proposed under the UP-AGREES project. This commitment to transform the agricultural sector through digital technologies is evident in the strategic planning and proactive measures undertaken by the state. The followig developments highlight the readiness of GoUP:

Agridata Hub Digital Agriculture Stack: In May 2023, GoUP signed an MoU with the Government of India under the Digital Public Infrastructure Initiative (AgriStack). The creation of databases for Land Record Registry, Farmer Registry, and Crop Registry through Agristack will facilitate farmers in various activities and form essential components of the Agridata Hub.

FPO Shakti Portal: The state has developed and is enhancing the FPO Shakti Portal to strengthen digital applications for Farmer Producer Organizations (FPOs), aligning with the project's objectives.

RFP for Weather Stations: An RFP for Automatic weather stations has been issued, with procurement expected before the project's implementation, demonstrating readiness in integrating weather data into the digital platform.

Satellite-Based Crop Acreage and Yield Estimation: The government has conducted pilots and commissioned projects for satellite-based crop estimation, setting the base for crop advisories and carbon emissions calculations, and exploring collaboration with space agencies. UPDASP has already been conducting crop acreage survey through satellite.

These essential developments, along with ongoing projects of the government with IFC Agritech Advisory, Water Resource Group (WRG) , and BMGF reflect a comprehensive and strategic approach by GoUP. The alignment with national initiatives, development of core registries, existing digital platforms, proactive procurement, and exploration of advanced technologies showcase a commitment to leveraging digital technologies for the benefit of the agricultural sector in the state.

Implementation Model

The implementation of a Digital Agriculture ecosystem and a statewide public service delivery mechanism in Uttar Pradesh, involving multiple stakeholders, each with their unique objectives and expectations, calls for a robust governance framework. This is crucial to ensure that the project is aligned with the strategic objectives, manages risks effectively, and delivers value to all stakeholders. The framework needs to be based on the principles of project management, such as clear communication, stakeholder engagement, risk management, and continuous improvement.

Drawing from global best practices, the governance framework should also incorporate elements of user-centric service design, data interoperability, digital inclusion, and continuous innovation. For instance, the UK's "Digital by Default" standard and Estonia's X-Road data exchange layer offer valuable insights into setting clear criteria for digital service delivery and enabling secure data exchange, while also ensuring data privacy and security. South Korea's comprehensive e-Government framework and Denmark's common public sector Digital Post solution provide examples of efficient data exchange and simplified

access to digital services. New Zealand's Service Innovation Work Program emphasizes the importance of improving the user experience and using data more effectively, with a focus on continuous improvement based on feedback and performance data.

The proposed governance framework is designed with the objective of providing a formal project management structure, with documented roles and responsibilities, ensuring accountability and transparency. It also includes strong change management protocols to adapt to evolving circumstances and risk management to identify and mitigate potential threats. Performance management will be integral to the framework, with a baseline established to measure and track the progress of the project. Lastly, mature value delivery capabilities will be developed to ensure the efficient delivery of public services, with initiatives to improve digital literacy and provide affordable internet access to ensure digital inclusion. The table below identifies the key aspects and roles and responsibilities for an enhanced digital agriculture ecosystem governance structure:

Table 56: Key aspects and roles and responsibilities for a digital agriculture governance structure

Group	High Level Activities	Stakeholders	Roles and Responsibilities
Steering Committee	Strategic Direction Setting, Decision Making, Issue Resolution, Alignment Check	PD UP-AGREES (Convener) **Members:** APC, Secretary Agriculture, Secretary Revenue, Secretary Finance Heads of Department of Horticulture, Fisheries, Mandi Parishad, key decision makers from all other allied departments	Provide strategic direction, make critical decisions, resolve strategic and inter departmental collaboration issues, ensure data sharing among departments, Oversee alignment with broader objectives of the digital agriculture ecosystem and service delivery platform
Project Management Unit (PMU) – Digital Innovations Unit	Project Planning, Vendor Coordination, Allied department coordination, Risk Management, Communication, Digital platform, and service delivery ecosystem monitoring	Project managers ICT, Business Analyst and coordinator, M&E specialist, Communications (IEC) In charge, Procurement Specialist	Manage day-to-day project activities, coordinate project activities, manage risks and issues, communicate with stakeholders, monitor project performance, conduct UATs, Support RFP preparations
District Project Implementation Unit (DPIU)	Support ICT operations at District level	Block level ICT resource person	Data coordination, capacity building of field resources of all allied departments on apps

Group	High Level Activities	Stakeholders	Roles and Responsibilities
			usage, monitoring of data submission and coordination with PMU digital helpdesk
Technical Working Group – Digital Transformation	Proposal Evaluations, Technical Design, Data Management, Security Management, Technical Issue Resolution	Project managers ICT, Business Analyst and coordinator, invited members from external technical agencies and PIUs (e.g. Department of IT, Department of horticulture, department of fisheries, Revenue department, IIT Kanpur, BHU, IIM Lucknow, IRRI, Digital development experts from agriculture and other institutes such as BMGF, IFC etc.)	Handle technical aspects of the project, design and implement technical solutions, manage data and ensure data interoperability, ensure system security and privacy, Evaluate proposal and integration modules
User Advisory Group	Feedback on provisioned services, System Testing (UAT), User Advocacy for new services and UI enhancement	Project managers ICT, Business Analyst, District Agriculture Officers, Members from key user groups (e.g. Farmers, FPOs, Agritech entrepreneurs, large agritech companies)	Provide feedback on system usability and functionality, participate in system testing and validation, advocate for user needs and priorities, provide feedback on effectiveness of Grievance redress

Implementation Timeline

The proposed digital architecture shall be designed based on following three-pronged strategy:

(i) **Data-enabled ecosystem for service delivery & evidence-based decision support systems (Linked Spatial and non-Spatial Data)** - The long-term objective of the intervention will be to establish the first-ever Indian 'state-level digital agriculture ecosystem' with a digital agriculture data stack, as a *shared public infrastructure (DPI)* The proposed ecosystem will be driven by an underlying user-centered 'growth diagnostics framework' to identify the most binding constraints and drivers for small holder farmers and women farmers, so that policy priority can be targeted on those factors that would have the biggest direct impact on growth.

(ii) **Sector services efficiencies**. The integrated platform will support the implementation and operations of an 'Agritech Applications Stack' to provide scalable farmer-facing services to small holder farmers. The platform will be developed based upon the principles of **IndEA** (India Enterprise Architecture) and interoperate with the India Digital Ecosystem for Agriculture (**IDEA**). Accordingly, it will be supported by a backend data stack, with small holder farmers and women farmers' data provided by diverse partners viz. Kisan Sewa Portal, FPO Shakti Portal, Horticulture Portal, Mandi Parishad, and other digital platforms developed by state government, central government, industry partners & civil society organizations.

(iii) **Collaboration and co-creation driven**. Many digital initiatives have been implemented /are under implementation in Uttar Pradesh. However, considering the scale and complexity of the challenge, no single stand-alone entity/system is qualified to provide sustainable solutions and capacity-building approaches on its own. Therefore, the proposed platform will provide a common marketplace to facilitate collaboration and co-creation of solutions and services focusing on small, marginal, and women farmers through multiple farmer-facing channels (including online, mobile, chatbots, call centers, and facilitated offline). A phased approach along with a high-level roadmap for the Integrated Digital Farmer Services Ecosystem for Uttar Pradesh as depicted in figure 3 below:

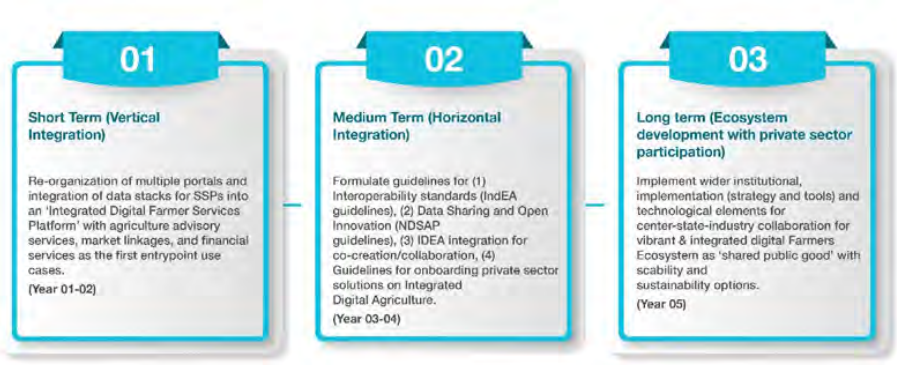


Figure 33: Phased implementation of Integrated Digital Farmer Services Ecosystem

Table 57: Implementation time-line Digital Architecture and Technology Services

Activity	Year 0				Yr 1			Yr 2				Yr 3				Yr 4				Yr 5				Yr 6			
Requirements Study, FRS & RFP Publication																											
SI Selection and Award of Contract																											
Development & deployment of Uttar Pradesh AgriData Hub and Applications Stack for Project Components																											
Stabilization of Digital Platform and onboarding of value add applications (FPO Shakti, IFC, WRG etc.)																											
Rollout across state and trainings for Agriculture and Allied Departments																											
Capacity Building, Updates, Maintenance and Support																											

Key Outputs

Table 58: Key Outputs for Digital Architecture and Technology Services

Stakeholder	Outputs
Government	• Enhanced efficiency and transparency in implementing agricultural programs • Higher investments flowing into digital agriculture, due to a standards-based approach • More accurate, comprehensive, and up-to-date data for planning & operations • Issuing Weather and Price Advisory
Farmers	• Better productivity through real-time advisories on crop management • Better price realization with market-related advisories and access • Control of personal data through consent-driven access at record-level
Agriculture Industry	• Enhanced operational efficiency due to data-driven market decisions • Access to larger markets for products and services due to the ability to connect to other markets • Shorter time-to-market due to the conducive environment of the digital agriculture Ecosystem • Regulatory certainty arising out of compliance standards and specifications

Risks and Mitigants

Digital agriculture transformation initiatives proposed under component 3A represent a paradigm shift in the way agricultural practices are approached, managed, and optimized in the state. The state's ambition to harness digital technologies aims to address the myriad challenges faced by its predominantly small and marginal small-scale producers, who constitute a significant 91% of its farming community. By leveraging the power of digital technologies, UP-AGREES project aims to enhance productivity, improve resource management, and provide timely and accurate information to farmers, by building on and accelerating the initiatives already underway. However, as with any significant transformation, the journey to digital agriculture is fraught with potential risks. Based on insights from similar initiatives in other Indian states and globally, it is evident that the challenges are multifaceted, encompassing technical, organizational, and socio-economic dimensions.

Historically, initiatives of a similar nature encounter hurdles ranging from technological integration issues with legacy systems to resistance from stakeholders unaccustomed to digital interventions. Additionally, the vast and diverse agricultural landscape, coupled with

varying levels of digital literacy among farmers, poses unique challenges. Ensuring data security, managing stakeholder expectations, and navigating the intricate policy and regulatory environment are other areas of concern. Recognizing these risks early on and devising effective mitigation strategies is paramount to the success of digital agriculture transformation initiatives proposed under the component. Table below provides summary of key risk and mitigation measures proposed:

Table 59: Risks and Mitigation for Digital Architecture and Technology Services

Sr.	Risk	Mitigation Measures
01	**Policy and Regulatory Environment** Absence of specific Digital Agriculture policy mandating data standardization and data sharing can hinder the development of a unified Agriculture Data Hub as a shared Digital Public Infrastructure (DPI)	Formulate and update relevant policies that align with current trends and technologies, ensuring a conducive environment for the project's success.
02	**Stakeholders' Engagement** Misalignment or lack of shared vision among allied departments, research agencies and end users, which can hinder the project's progress.	Organize regular dialogues with all stakeholder groups to discuss project progress, challenges, and future plans. This will foster a sense of community and shared ownership among the stakeholders.
03	**Technical Skill Gaps and limited Management Capabilities** The Department of Agriculture (DoA) staff might lack the necessary technical proficiency to utilize and manage the digital tools and services provided by the project.	Staff will be trained on managing, analyzing, and interpreting data, covering topics such as data collection, cleaning, analysis, and visualization. Training will be provided on how to use the Agriculture Data Hub, AI-based analytics tools, GIS, and other digital tools. Recruitment of skilled staff will be done in the PMU for overall management of the digital platforms and ensure its usage.
04	**Lack of digital literacy** There's a risk that diverse user groups, including farmers, might not be digitally literate enough to utilize the platform effectively.	Users will be trained on how to use the digital services, including accessing and navigating the digital platform, using various digital services, and protecting their digital data. Regular workshops will be held to engage with users, understand their needs, and gather feedback.
05	**Feedback and Grievance Redressal** There's a risk that farmers might not be satisfied with the platform or might face issues that need to be addressed.	The project will establish a mechanism within the platform for farmers to raise concerns, provide feedback, and have their grievances addressed promptly. This will help improve the quality of services and ensure farmer satisfaction.
06	**Data Security and Privacy** Digital transformation can expose sensitive data to potential breaches.	Implement robust cybersecurity measures, conduct regular audits, and ensure compliance with data protection regulations.

Sub-Component 3B: Agri-Finance Ecosystem

Background

There are many advantages to creating a thriving agri-finance ecosystem in Uttar Pradesh that can enable farmers and other value chain players in the agricultural landscape access finance. The Agriculture and Allied Sectors account for 26.15% of Uttar Pradesh's Gross State Value Added (GSVA) at current prices, contributing around Rs 2,319 billion to the UP's economy. The share of agriculture GSVA increased from 24.6% in 2018 to 26.15% in 2020. Uttar Pradesh Agri Exports has registered an average growth of 5.42% from 2016 to 2021 with the export value of APEDA portfolio agri-products being approximately INR 180.5 billion in 2021-22. At the same time, many challenges that exist in the agriculture finance sector in UP need to be addressed in order to unlock the agriculture potential of the state.

This sub-component will strive to improve per capita agri-credit from the formal financial institutions to improve productive investments and competitiveness in the agri-allied areas. The proposed interventions will cater to the diverse needs of agri-producers and market players including small and marginal farmers, farmer collectives, and agri MSEs. The proposed project interventions include:

(i) **Digitizing Kisan Credit Card (eKCC)** by leveraging the GoI's Agristack and International Finance Corporation's (IFC) ongoing technical assistance to GoUP. The digital KCC will reduce transaction costs and improve turnaround time and scale of financing for small and marginal farmers while enhancing transparency and portfolio quality of the lenders.

(ii) **Alternative Investment Fund (AIF)** to complement the project's investments in developing select value chains. The AIF will be used to crowd-in long-term private sector investments in addition to providing customized solutions (equity-debt and hybrid) for agri MSEs in the state.

(iii) **Agri Challenge Fund** to incentivize private sector entities to provide solutions for localized challenges of project beneficiaries through market-based approaches. This intervention will also work to pilot cutting-edge Agtech and Agfintech solutions.

Further, cross-cutting technical assistance for building capacities of project staff, beneficiaries, and partners such as commercial lenders will be embedded in all the proposed interventions by procuring services of such technical assistance providers.

Objectives

To foster the creation of a thriving and innovative agri-finance ecosystem in Uttar Pradesh

Guiding Principles

- Respond to different life cycles and stages of business

- Improved/new Financing products for small and marginal farmers: through digital Kisan Credit Card (eKCC) issued by Banks which considerably improves turn around time for such credit delivery, scale of financing and tracking mechanism thus leading to better portfolio quality for Fis.
- Respond to new/nascent business (unorganized sector)
  - Individual agripreneurs, startups and FPOs/collectives
  - Incubation support to ease access to finance
- Emerging MSMEs (1-2 years business cycle)
  - Individual agripreneurs, startups and FPOs/collectives
  - Grants
- Mature MSMEs (>2 years stable/positive cashflows)
  - Agri SMEs and FPOs/collectives
  - AIF and Facilitating formal financing

- Introduce interventions to foster innovation and competitiveness in UP's agriculture sector e.g. Challenge Fund
- Fostering ecosystem stakeholders on demand and supply side through capacity building, awareness and education

Proposed Interventions

Different financial instruments would target different firms at differing levels of maturity. The targeted segment could be:

a) Individual Farmers: Agriprenuers,
b) Farmer Producer Organisations (FPOs) and similar collectives, such as Producer groups, cooperative societies such as PACS and SHG-CLFs
c) Agri-MSMEs: Formal registered entities

They will be supported based on their needs and their level of maturity through the following financial instruments:

3B.1 Uttar Pradesh Agribusiness Alternate Investment Fund (UPAAIF) For Agri MSMEs/Start-ups

UPAAIF will invest in Agri and allied sector MSMEs with established business and revenue model having high growth potential, and scalable ideas/innovative solutions for application and expansion i.e. further growth which needs customised financing which could be equity/debt or combination with higher gestation period of repayments which cannot be provided by commercial banks.

SEBI Registered Alternate Investment Fund (AIF)

AIF means any fund established or incorporated in India which is a privately pooled investment vehicle which collects funds from sophisticated investors, whether Indian or foreign, for investing it in accordance with a defined investment policy for the benefit of its

investors.[30] Regulation 2(1)(b) of the SEBI Act, 2012 defines AIFs, which can be established either through a company, a trust or a Limited Liability Partnership (LLP).[31]

Similarly, under UP-AGREES, the Uttar Pradesh Agribusiness Alternate Investment Fund (UPAAIF) will be a SEBI registered AIF to provide risk capital (combination of equity, quasi-equity, and debt) and technical assistance to agribusiness MSMEs with high growth potential, and scalable ideas/innovations/business models. The Eastern UP and Bundelkhand regions will be the locus of activity, with investments ranging from an estimated Rs 50 Lakhs to Rs 15 crores. Access to risk capital is expected to allow some of the investees to graduate to high-growth enterprises that will contribute to improved productivity and job growth in the sector. The UPAAIF will crowd in further private investments into the state by demonstrating that such investments can deliver financial returns along with developmental impact.

Investment Fund Approach

SME Funds are a prevalent model in developing countries. These funds are set up like Private Equity (PE) or Venture Capital (VC) funds and invest in SMEs through a finite life vehicle. SME fund managers typically raise fixed pools of capital that are then invested in a diversified set of companies, often across many industries. The fund managers source deals by working with a network of intermediaries; developing business linkages and competencies in specific sectors; and by scouring a given market for investment opportunities. Apart from providing financing, these funds typically take a "capital plus" approach. Through this approach, they help the companies in their portfolios to enhance management capacity, improve market focus and presence, strengthen governance, and manage growth. As such, these firms are widely linked to job creation.

Investment funds with a development perspective often provide complementary technical assistance which is coupled with lower return expectation than a pure play market based approach of a PE/VC. TA is provided pre-investment and post-investment to address targeted capacity constraints such as accounting/ financial statements, management information systems, governance, strategy etc. By providing technical assistance, investment funds open doors for additional investment, improve portfolio performance, and reduce financial and governance risks.

Government intervention in PE/VC is not unusual; typically, intervention in the PE/VC ecosystem manifests itself through two key approaches.

- The first is a more traditional role for the government, where it helps create a conducive legal/regulatory and tax framework for PE/VC funds. For example, SEBIs enabling regulation for AIFs provide this framework in India

[30] https://www.sebi.gov.in/
[31] https://www.bseindia.com/

- The second, and more interventionist approach, is when the government recognizes that a lack of risk financing is undermining the innovation ecosystem and preventing innovative ideas with commercial potential from reaching the market. In this case, the government may elect to play the role of an anchor and/or passive investor. The intervention is justified because early-stage financing, while able to deliver impact, is well known to be consistently under-supported. In fact, academic research finds government lead alternate investment expands the total pool of financing for the market as well as at the enterprise level. In India, example of Govt's investment in AIFs is two fold: a) invest in Fund of Funds i.e. mother fund which invests in smaller, diverse active AIFs managed by industry players and b) Invest by way of directly establishing AIFs and acting as an anchor investor in areas which need public good investments to attract further private capital.

Global Landscape of Agribusiness SME Funds:

Public investors in developing countries support agribusiness investment funds, enabling private investors to take risks and pursue opportunities in farmer cooperatives, rural microfinance institutions, and agribusiness SMEs. These funds offer a broader range of financial services than typical PE/VC funds, including working capital, trade financing, subordinated loans, mezzanine finance, and equity investments.

Grant funds for Technical Assistance (TA) accompany most agribusiness SME funds and funds for producer organizations. On average, the size of a grant is around 5-7% of that of an investment fund.

Govt Supported Investment Funds: In the recent years, several state governments have come forward to invest in priority sectors through professional managers. Some key examples are Maharashtra Social Fund, West Bengal MSME Fund, DFID supported 4 state Samriddhi Fund, Start Up Funds of Assam and Tripura besides recent World Bank supported Assam Agri SME Fund. Equity and quasi-equity are the instruments commonly used across these funds. Besides Govt of India has provided Rs 10,000 cr allocation to a Fund of Funds (FoF) to be managed by SIDBI for investments in daughter Alternate Investment Funds (AIF) managed by professional m fund managers.

Return target varies depending on the strategies of the funds: Some agribusiness and impact funds target commercial return of IRR 18-25%. Other funds in the same category pursue sub-commercial return of IRR 10-16% with a higher emphasis on development impact. There could also be a hybrid model with differential risk return matrix for different investors wherein govt lead investments expect lower return (with perhaps higher risk) which attracts private sector co-investments. This model is a market making model to leverage market player's investment in relatively less attractive sectors from financial return perspective.

Policy & Regulatory Environment

The UPAAIF will be subject to ongoing supervision by a regulatory body and key regulatory regime. SEBI (AIF) Regulations, 2012 provides the regulatory regime for PE/VC funds as a separate asset class. It sets out the key parameters of such funds to obtain a certification of registration from SEBI. SEBI notes that Category II AIFs cannot receive any special concessions or incentives from the government/ regulator.

Advantages for investing in UP

- **High growth in the agricultural sector of UP**: Agriculture and Allied Sectors account for 26.15% of Uttar Pradesh's Gross State Value Added (GSVA) at current prices, contributing around Rs 2,319 billion to the UP's economy. The share of agriculture GSVA increased from 24.6% in 2018 to 26.15% in 2020.
- **High growth of agri-exports**: Uttar Pradesh Agri Exports has registered an average growth of 5.42% from 2016 to 2021 with the export value of APEDA portfolio agri-products being approximately INR 180.5 billion in 2021-22.

Key Challenges

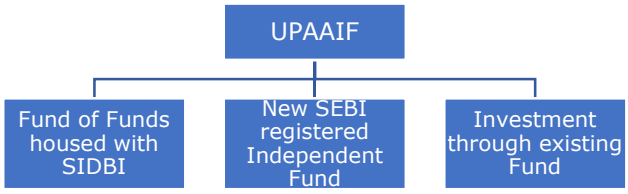
Uttar Pradesh has 14.2 % of MSMEs (including start-ups) in India. Despite this, agribusiness MSMEs and startups are yet to take off in UP due to underdeveloped agriculture value chains. This includes poorly organized farmers, insufficient processing facilities, lack of sufficient financing options (debt and equity), and a poor enabling environment.

The objectives of UPAAIF are:

- Providing risk capital (equity/quasi-equity-debt and debt) for high growth Agribusiness SMEs in UP with specific focus on Eastern UP and Bundelkhand regions.
- Providing technical assistance to selected AgriSME to improve their formalisation, competitiveness and business growth. Besides making separate allocation for TA fund to complement investment Fund, GoUP may choose to further reinvest returns generated under AIF in further strengthening TA for Agri SMEs.

<u>UPAAIF Preliminary Design</u>

1. The abovementioned objectives will be accomplished either by:
    - Investing in a Fund of Funds like SIDBIs FoF, whereby SIDBI will pass on the funds to relevant funds/investment managers for deployment or by
    - Creating a new SEBI registered fund, managed by an Independent Fund Manager through a public procurement process (as shown in the figure below); or by
    - Investing in an existing investment vehicle (fund/company) promoted by DFI (subsidiaries of NABARD, SIDBI etc), or of state/central govt and government supported entities (IIM-B, IIMA-CIIE etc.)



The UPAAIF fund can be created in following ways:

1. Invest in existing Fund of Funds whereby FoF will pass on the funds to relevant funds/investment managers for deployment and supervises its performance
2. Create a new SEBI-registered fund, managed by an Independent Fund Manager.
3. Investment through existing Funds/Fund Manager on nomination and/or co-investment basis.

Figure 34: UPAAIF design options

2. The key features of the Fund, in both cases, are expected to be:

- **Total Fund Size**: a fund-size of USD 20 mn / Rs 160 cr
- **Investment Size**: Investment deals of USD 60000 - USD 2mn
- **Managed by**: A competitively selected Fund Manager or existing FoF/AIF scheme of SIDBI/alternate DFI/ /Govt supported entity or on nomination basis to a govt backed fund house (TBD).
- **Investment committee**: No government participation in the investment committee and same will be managed by professional under engaged fund manager. GoUP, through its Limited partner (key anchor investor), could define guiding principles and investment areas
- **Fund Life**: 7-10 years in fund life, extendable to 12 or 15 years (since agribusiness sector requires longer gestation periods)
- **Key Sector**: Allow investments for SMEs in agribusiness & agri finance, including sub-sectors like agri- Food processing, Horticulture fisheries & Agriculture infrastructure businesses like cold storage/ warehouses /logistics besides Agfintech
- **Investment in <no.> investee companies**: Existing SMEs that are in early, growth and maturity stage; and start-ups/greenfields.
- **Investments through–** Equity, Debt and combination of such instruments (hybrid) Compulsory Convertible Preferential Shares (CCPS), Optional Convertible Preferential Shares (OCPS), Non-Convertible Debentures (NCDs)
- **Technical Assistance**: Provide pre and post-investment technical assistance to SMEs to relieve capacity constraints which could be to the extend of upto 10% of fund value
- **Currency Risk**: Denominated in Indian currency to eliminate currency risk, particularly for non-export oriented SMEs
- **Policies**: Adherence to World Banks Group policies & requirements (e.g. Performance Standards, Restrictions on Category A Investments, E&S Safeguards,

Exclusion List, Integrity & Anti-Corruptions Provisions, Off-Shore Financial Center Policy)

- **Limited Partners**: The fund will seek additional capital from commercial Limited Partners (LPs) and **GoUP will also have to nominate its anchor LP (entity which will be overall responsible for AIF management)**

3. The eligibility & selection criteria:

- Fund Managers that could potentially manage the UP-AGREES fund include the following three categories:
    - Existing fund managers currently managing SEBI registered AIFs in India with proven track record
    - New fund managers, with individual or team track records, seeking to build a fund-level track record
    - Social enterprise/ impact fund managers
- The criteria for the investee company would be decided in line with the strategic objective of the Government.

4. Potential co-investors: Proposed AIF through its mandated fund manager would endeavour to get contribution from market players, both from public and private sector in the fund include the following categories:

- Public sector investors such as National Bank for Agriculture and Rural Development (NABARD), Life Insurance Corporation (LIC), Small Industries Development Bank of India (SIDBI, including SIDBI ventures and/or SIDBI managed FoF)
- Corporates interested in the agribusiness space in Eastern UP and Bundelkhand region
- Impact investors currently interested in North India/Agribusiness
- Existing Funds & Private investors (eg. Pension funds, insurance companies) may also co-invest with UP-AGREES
- Other potential players with an inclination toward project commodity value chains

5. The fund is likely to require both financial and non-financial incentives in order to attract private participation, which is important for the fund's success. Suitable provisions would be kept for such incentives. Selected Fund Manager will also provide Technical Assistance to potential investee and investee companies.

6. Based on GoUPs decision on method of AIF fund manager selection, the Expression of Interest (EOI)/ Request for Proposal (RFP) process to select a Fund Manager would seek to solicit the best investment strategies, while aligning with the strategic objective to invest risk capital in agribusiness SMEs. Standardized parameters would allow cross-comparison between proposals, these include but not limited to:

- Track record the fund manager

- Ability to mobilize additional capital
- Proposed fee structure parameters such as management fees, hurdle rate, and carry (share in profits by the fund manager)

Activities to be covered under the UPAAIF

The activities covered under the UPAAIF are listed in the table below and the detailed description is provided in the table below:

Table 60: Main activities under UPAAIF

S.N.	Main Steps/Activities
1	Selection of Limited Partner (LP) Department/entity of GoUP for the proposed Fund under UP-AGREES and allocation of Funds budget by Govt Order as first tranche contribution.
2	Conducting a Feasibility Study and /or Guidelines for engaging a Fund Manager and Legal Counsel
3	Hiring a Legal Counsel for process management and compliances
4	Request for Proposal Package for selection of a Fund Manager or GoUP order and agreement for selection of fund manager on nomination basis
5	Registration of UPAAIF with SEBI
6	Signing of Agreement with Fund Manager and related parties

1. Selection of Limited Partner Department in the Fund

Finalization of the Departments to become limited partners in the fund will be done by the Government of UP. This will be done through assessing the strength and capacity of the potential Departments to responsibly handle and manage a limited part of the fund.

2. Feasibility Study

A Feasibility Study of the fund may be conducted which will address two main components: (i) demand-side mapping of agribusiness SMEs with risk capital needs, with the aim to identify a potential pipeline for the fund; (ii) supply-side assessment of the overall environment for risk capital financing, including bank financing, subsidies, and private equity/venture capital investments. This study would also propose a template for the fund design and structure, which would form a reference for the EOI/RFP process.

3. Hiring a Legal Counsel

A local counsel who specializes in investment funds, has the requisite qualifications and experience, and under the terms of references agreed with the Bank will be hired. This local counsel will provide advice in the preparation/review of the UPAAIF Operational Manual, and legal documents involving the establishment of the UPAAIF, or the contribution to an existing fund meeting all of the requirements of the UPAAIF Operational Manual besides facilitation regulatory compliances for establishment of the fund

An operational manual/guideline approved by UP-AGREES, hiring of a local counsel will be the disbursement conditions for the fund from the World Bank.

4. Request For Proposal package

In case GoUP decides to do a public procurement of Fund Manager , a RFP package will be put together for the selection of Fund Manager following the World Bank procurement procedure through competitive bidding which would require onboarding a legal counsel and a technical Support Organization (TSA) to support process for onboarding FM through open public procurement process.

Lists of Key Tasks to be performed by the Fund Manager:

- Registration with SEBI and other statutory compliances
- **Scouting and selection of investee companies:** The fund will be widely publicized in order to reach out to a larger number of potential investee companies.
- **Screening of Proposals:** the Fund Manager will go through the different proposals received for the fund.
- **Providing Technical Assistance to Investee Companies:** The Fund Manager will provide the required technical assistance to the investee companies (through their own resources or outsourced). GoUP may choose to appoint alternate TA provider who would work in tandem with the fund manager.
- **Coordination with advisory committees and co-investors**
- **Sourcing of investment funds from other investors**

5. Registration of UPAAIF with SEBI

SEBI will grant registration to UPAAIF, allowing it to operate as a recognized investment entity.

6. Signing of the Legal Agreement

A legal agreement will be signed between the Government of Uttar Pradesh (GoUP), and the fund manager with world bank approval as per prevalent world bank procurement guidelines.

Institutional and Implementation Arrangement (Preliminary)

The key elements of the implementation arrangements include:

1. Legal agreements between the Government of Uttar Pradesh (GoUP), and the fund manager.

2. The administration/management agreements between the GoUP and the Fund Manager

3. The financial management arrangement that will guide the flow of funds and fiduciary safeguards for the Project funds to be used as GoUP contribution to the Fund

4. The environmental and social safeguard arrangements.

Subject to confirmation by the World Bank's legal, financial management and safeguards specialists, the key elements of the implementation arrangements are expected to be as follows:

- **Subsidiary Agreement and Project Agreement**

The Project Management Unit (PMU) will sign a subsidiary agreement with the department, GoUP that is designated as the LP for the Agribusiness SME fund. The Subsidiary Agreement will set forth all the terms and conditions under which the GoUP will make the funds available to the Fund Manager

- **Administration and Management Agreement, and Fund Operations Manual**
    - The UPAAIF will be under the implementation responsibility of designated LP of GoUP. While the selected fund management company will be responsible for managing the Agribusiness SME Fund itself, this will be done in accordance with the guidance and the final version of the Fund Operations Manual.
    - Once the winning bid for the Agribusiness SME Fund Manager tender process has been awarded, the designated LP department will sign an Administration Agreement with the selected Fund management company. This will be done to ensure the Fund management company complies with the Project Operations Manual as well as UPAAIF Operational Manual. The fund itself would be governed by standard investment documents, such as a Limited Partnership agreement, Subscription Agreement, Management agreement, Prospectus, or Side Letter, which will define the terms and conditions of the Government's investment. There may be other legal/compliance requirements to be fulfilled, in accordance with prevalent SEBI regulations.
    - The GoUP through its designated LP will have broad oversight of the Project and will receive full reporting from selected fund manager regarding project activities on a predefined periodic basis.
    - Financial management implementation arrangements will be defined in detail in the Fund Operations Manual. The Limited Partner will also report to the World Bank through PMU/LP as agreed by stakeholders.

Sustainability

The rising appetite for such companies among investors and the higher prices being enjoyed by agri-commodities in recent years would continue to sustain Private Equity interest in the industry.

Table 61: Key Output Indicators and Intermediate Level Indicators

Sr No	Component (Indicator) / Year	2024 -25	2025 -26	2026 -27	2027 -28	2028 -29	2029 -30	Total
1	Total number of firms invested by the UPAAIF	NIL	2	5	10	3		20
2	Capital contribution to UPAAIF / company (USD,mn) from the project	NIL	1	8	8	2		19

Table 62: Illustrative List of Investments in UPAAIF (Rs. Cr)

Item of Expenditure	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	Total
Feasibility study, legal firm cost, support RFP preparation & other studies	2.5	0.5	0.5				3.5
Capital contribution to agribusiness fund / company	Nil	5.00	55.00	75.00	25		160
Technical Assistance	1.00	3.00	5.00	3.00			12
Fund Management Fee*	TBD	TBD/8.00	TBD/8.00	TBD/8.00			24
Total	**3.5**	**16.5**	**68.5**	**86**	**25**		**200**

Table 63: Risk and Mitigation Measures for UPAAIF

Potential Risks	Mitigation strategies
SMEs typically need risk capital beyond the average life of a PE/VC fund	• Extended fund life (10+ years) • Flexibility in investment strategy (sector target, ticket size and investment instruments)
Difficulties in attracting fund manager with successful track record	• Market intelligence and strategy to reach out to relevant fund managers • Involving selected manager in designing the fund structure • Subsidy to cover some fund management costs, such as start-up costs
Limited pipeline	• Feasibility study will include analyzing the potential pipeline • Pre-investment technical assistance support for the investees
Limited exit options	• Strong linkages with the eco-system through fund manager and investors (LPs) • Marketing of the fund and investees in the Indian PE/VC industry through Project Technical Assistance • Post-investment technical assistance for investees would make it easier to exit

3B.2 Challenge Fund

Current Issues

In Uttar Pradesh, the value chain for high-value agricultural commodities (such as groundnuts and chilies) is currently underdeveloped, demonstrates limited innovation, uses technology at a very low level, has inadequate incentives, and has a poor enabling environment. As a result, only a small number of high-value agriculture products coming

from UP are competitive, to be marketed nationally and globally. Government insurance schemes like Pradhan Mantri Fasal Bima Yojana (PMFBY) are restricted to a few crops and do not cover allied areas (such as fisheries and poultry) and agri and allied sector insurance is not available at the farmer collective level (FPOs). Currently, there are no financing mechanisms for encouraging and incentivizing innovation in agricultural and allied sectors (including agri-finance/AgFintech and agri-infrastructure) in Uttar Pradesh. Therefore, the project will support innovation in the agriculture & agri financing domain including allied sectors through the Challenge Fund. The Challenge Fund will finance innovations that address the specific problems of the project clusters and commodities.

Proposed Measures

The Challenge Fund will support testing of innovative, solutions for the development of crop clusters under UP-AGREES so as to further fine tune the same leading to market based scaling up. The innovative solutions will cover the two broad themes of agribusiness and agri-finance as shown in the table below:

Table 64: Innovative solutions covered by the Challenge Fund

Agribusiness	Agri-finance
Sustainable Inputs	Agriculture Insurance (inc allied sectors such as fisheries etc)
Production Solutions and Technology	AgFintech innovations using AI.ML, Block chain technologies to further agri financing
Logistics (storage solutions and other assets)	Value Chain Finance, cash flow based financing,
Primary Processing	Trade receivable exchange lead discounting for agri business SMEs
Value addition	Alternate channel based phygital- digital lending and customized agri insurance
Water conservation, Irrigation	
Climate Smart Agriculture	
Marketing innovation (e.g., Open Network for Digital Commerce)	

Budget: Approximately 15-20 sub-projects at an aggregate value of Rs. 30-40 cr (Rs.1-3 cr funding/unit) with an average implementation period of up to 18 months each, are proposed to be supported by the project in a phased manner.

Problem Identification

Challenge funds will be used for innovative problem-solving. The CDPs (prepared as part of component 2.1) would map the constraints in the value chains, agricultural finance,

agricultural infrastructure, etc. It would identify the problem statement by analyzing the factors and problem areas inhibiting the development of crop clusters in the Eastern UP and Bundelkhand regions. The Challenge Fund will be set up to address these identified problems statements. There will be provision of funds for the identification of additional problem statements, if required.

Proposed Process of Challenge Fund

The beneficiaries of the Challenge fund will include all types of entities (for profit and not for profit CSO), that:

- Can provide innovative solutions but need viability gap financing to prove business model
- Are not getting support from conventional channels in terms of testing and grounding solutions
- Can contribute to improving the productivity and visibility of the agriculture and agri financing sector in Eastern UP and Bundelkhand region
- Can contribute to addressing market failure and improving competitiveness of the AgriBusiness specifically aligned to UP-AGREES objectives and priorities.

This can include value chain actors (farmers, processors, exporters etc.), agri-tech and agri- fintech providers, technical support agencies /consultants/domain specialist (specifically in storage, packaging, logistics, market information, etc.).

The process of Challenge Fund is shown in the table below and a detailed description in provided below the table:

Table 65: Main activities for the Challenge Fund

S.N.	Main Steps/Activities
1	Hiring of Technical Support Organization (TSA)
2	Onboarding of the Challenge Fund Evaluation Committee (CFEC)with external industry specialists
3	Publish Call for Proposal (CFP) for Challenge Funds and road shows, industry stakeholder outreach initiatives
4	Outreach activities to get responses to CFP
5	Preparation of Challenge Fund Proposals
6	Initial screening of Challenge Fund Proposals
7	Field Verification of Challenge Fund Proposals
8	Evaluation of Challenge Fund Proposals
9	Approval of Challenge Fund Proposals
10	Signing of the Grant Agreement for approved projects
11	Tracking progress as per milestones agreed

1. Hiring of Technical Support Organization (TSA)

A firm, or a combination of firms and consultants, will be contracted to facilitate the process of the Challenge Fund. These contracts will be performance-based.

Role of the TSA: Scope of work of TSA will include support for developing call for proposals, conducting outreach, facilitating the selection of proposals, facilitating the funding of selected projects through grant agreements between the project and selected entities, monitoring their implementation, and reporting results. TSAs key role would be to develop operational manual and guidelines which defines operating procedures and selection modalities.

2. Hiring of the Challenge Fund Evaluation Committee (CFEC)

A firm, or a team of senior sector specialists, will be contracted to form a Challenge Fund Evaluation Committee. The CFEC will be a mix of fiduciary and resource management experts with agribusiness and agri-finance expertise, with extensive industry experience in respective domain. The CFEC will be responsible for evaluating the Challenge Fund Proposals which will be the basis for awarding challenge fund grants. CFEC will ensure transparency and meritocracy in awarding challenge fund grants.

3. Publish Call for Proposal (CFP) for Challenge Funds

The Call for Proposals for the Challenge Fund will be based on the problem statements identified through CDPs. CFP will be published in newspapers at national, state and local level newspapers to invite proposals for Challenge Fund. CFPs will be widely advertised and disseminated in electronic media, print media, project website, seminars, workshops and direct contact, etc.

The project will release at least 2 CFPs for the Challenge Fund.

4. Outreach activities to get responses to CFP

State and regional-level investor meets, exhibitions, workshops, road shows, seminars, and focus group meetings will be conducted to get responses on CFPs.

5. Preparation of Challenge Fund Proposals

Challenge Fund Proposals will be submitted by the applicant as per a predefined standard electronic format. GPLFs will provide support in preparation of the proposal. Challenge Fund Proposals must be in accordance with Project Development Objectives (PDOs). The Challenge Fund Proposals will describe the following, but not limited to:

- Proposed solutions/models and how they address the problem
- Reason for proposed solutions to qualify for Challenge Funds
- Impact of the solution/model and its outreach
- Scalability Potential

- Spill-over effect
- An analysis of Social inclusion, Gender, Environment & Social Safeguards of the subproject

TSAs will provide help and handholding support to the applicants to develop Challenge Fund Proposal, if required.

6. Initial screening of Challenge Fund Proposals

PMUs along with TSAs will be responsible for screening each Challenge Fund Proposals to ascertain whether or not:

- The applicant(s) meet the eligibility criteria for participation
- The proposed subproject meets the eligibility criteria for the Challenge Fund

Respective PMUs with the help of TSAs will verify the project concept note. PMU will scrutinize the Challenge Fund Proposals on the following aspects:

- Challenge Fund Proposals as per standard format
- Eligibility of applicants
- Eligibility of subprojects
- Entity details
- Documents like Audited Balance Sheet, Bank Statements, etc.

7. Field Verification of Challenge Fund Proposals

Field verification of the Challenge Fund Proposals may be undertaken to check the necessity of interventions and also to verify Social inclusion, Gender, Environment & Social Safeguards aspects. A checklist for field verification will be created under the Operational Guidelines issued by PMU.

8. Evaluation of Challenge Fund Proposals

If the Challenge Fund Proposals fulfil the Environmental and Social Safeguard criteria, then the Challenge Fund Proposals will be evaluated on their potential to address the problem and scalability potential. CFEC, with support from TSA, will undertake the technical evaluation of Challenge Fund Proposals and score each Challenge Fund Proposal on the predefined parameters and shortlisted proposals will be taken to the evaluation committee for selectionThe financial and overall evaluation will be done by PMU as per pre-decided criteria. The Challenge Fund Proposals that clear the threshold will be sent for approval by the Approval Committee.

9. Approval of Challenge Fund Proposals

The Approval committee will give approval for the selected Challenge Fund Proposals. Rejected Challenge Fund Proposals will be returned to the applicants along with the comments. If they wish, they can submit the revised Challenge Fund Proposals in subsequent rounds after necessary improvements.

10. Signing of the Grant Agreement for approved projects

After approval of the Challenge Fund Proposal, a grant agreement will be signed between PMU and selected entities in a prescribed format.

Institutional and Implementation Arrangement

Facilitating the process of the Challenge Fund will be done by a **technical Support Organization (TSA)**, under the supervision and monitoring of PMU. The contract period with the TSA will be for a minimum of 3 years. The budget for the TSA for 3 years will be Rs. 3 Cr. The procurement policy for hiring TSAs will be followed as per the procurement policy of the World Bank that is applicable for hiring consultancy services. Lifecycle processes of the Challenge Fund will be managed by an ICT enabled application as embedded into Component 3A

Table 66: Risk and mitigation measures for the Challenge Fund

Perceived Risks	Mitigation Measures
Delay in implementing innovative projects	• TSA will be hired well in advance for various activities relating to Challenge Fund • Deliverables and time schedules with clearly marked out milestones and strictly monitored for adherence
The intervention would not address the problems	• Ensuring that the selection is broad based and the selected entity has previous experience in conducting such work. • Finances to be released in instalments as per deliverables output

Table 67: Challenge Fund Outcome or Performance Indicators

Sr No	Component (Indicator) / Year	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	Total
1.	No. of Sub-projects funded through Challenge Funds grants	NIL	3	7	8			18

Budget: Indicative budget of 15-20 proposals to be funded at a cumulative cost of Rs 30 Cr approx. excluding cost of TSA and allied cost.

Table 68: Challenge fund budget

Number of Projects Funded	Approx. Funding/unit Rs cr	Aggregate value Rs cr
15- 20	1-3	30-40

3B.3 e-Kisan Credit Card

Kisan Credit Card Scheme

The Kisan Credit Card (KCC) scheme was introduced in 1998 and issued KCCs to farmers on the basis of their holdings. The scheme envisioned uniform adoption of KCCs by banks to enable farmers to readily purchase agriculture inputs such as seeds, fertilizers and pesticides and access credit for production requirements. The scheme aimed to provide adequate and timely credit support to farmers under a single window banking system with flexible and simplified procedures to support farmers in the following:

- To meet the short-term credit requirements for
    - Cultivation of crops
    - Post-harvest expenses
    - Produce marketing loan
    - Consumption requirements of farmer household
    - Working capital for maintenance of farm assets
    - Other agriculture allied activities
- Investment credit requirement for agriculture and allied activities

Over the years scheme has been expanded to cover the animal husbandry and fisheries sector as well and is currently the main source of financing for small and marginal farmers as indicated below:

Table 69: KCC Coverage in India

Financial Year	Number of Operative KCCs #	Outstanding Crop Loan	Outstanding Term Loan	Outstanding Loan for Animal Husbandry and Fisheries	Total
2021-22	268.70	4,33,408	29,306	13,559	4,76,273
2022-23*	282.96	4,61,391	37,551	19,694	5,18,636
Number in lakh, amount in Rs. Crore					
* Data are provisional					
# The number of operative KCC accounts do not include non-performing asset (NPA) accounts					
Source: Public sector banks, private sector banks and small finance banks (excluding RRBs).					

The existing model of KCC delivery is cumbersome and inefficient due to lengthy legal procedures and paperwork leading to considerable delays. Additionally, farmers face constraints in the process due to inflexibility in use of bank branches and presence of several intermediaries, among others. With rapid progress in digitalization, India has embraced the concept of digital public infrastructure which encourages banks to adopt digital credit infrastructure.

e-KCC in Uttar Pradesh

UP has issued over 1 cr KCCs to small and marginal farmers contributing to 15% of the total share of KCCs issued pan India as shown below.

Table 70: KCC coverage in UP

Commercial Banks				Total			
Number of Operative KCCs		Amount outstanding under Operative KCCs		Number of Operative KCCs		Amount outstanding under Operative KCCs	
2021	2022*	2021	2022*	2021	2022	2021	2022
5,079	4,272	69,467.22	70,672.67	11,281	10,471	1,18,065.62	1,23,033.63
**Data is provisional.*							
Components may not add up to their respective totals due to rounding off.							
(Amount in ₹ Crore and number of issued cards in '000)							

Given the obvious benefits associated for the farmers and bankers alike, UP being the largest issuer of KCC, is best placed to upscale this benefit and considerably improve credit flow to small and marginal farmers through digital KCC that leverages data sets form different sources.

Digital platforms reduce the time taken for KCC issuance from 2-3 weeks to only a few minutes and can be done in a paperless, presence less manner by pulling and aggregating different data sets under agri stack such as digitized land records, farm/crop and farmer information including e-KYC, e-sign etc. This also holds potential for lenders to improve oversight of end use by using satellite imagery.

Hence, UP-AGREES will initiate this intervention starting with a pilot with stakeholders such as NABARD along with Regional Rural Banks (RRBs) and Central Cooperative Banks (CCBs) to supervise and support onboarding onto the digital KCC platforms and can further extend the same to cover commercial banks as well. UP-AGREES will support in the following areas of activity:

a) Capacity building: awareness and education of not just demand side but also invest in strengthening the capacities of the Banks to adopt new technology solutions
b) Program management (PMU): support project implementation through coordination and performance tracking, repayment tracking through KRKs, BC (Sakhi), Call Centre etc
c) Investments:
   (i) in one time cost of eKCC issuance and onboarding (cost of outsouring services, API data pull from different sources such as land record data souring, crop and weather data sourcing plus EKYC, e-sign, AUA authentication etc
   (ii) In technological capability upgradation of selected Banks (RRBs and/or CCBs in UP-AGREES areas).

The TSA will support in implementation of eKCC through the following:

- Conduct a study to understand demand side of eKCC and develop strategies to strengthen the process of implementation
- Identify RRBs, CCBs and commercial banks to support the onboarding process for digital KCCs
- Provide support in designing the process flow and implementation of onboarding on digital KCC platforms
- TSAs will monitor implementation progress of issuing eKCC through digital platforms
- Ensure coordination between stakeholders such as RRBs, CCBs and the project team
- Provide support for capacity building for banks and demand side borrowers
- Provide support to the project team members to adopt new technology and provide capacity building to field staff
- Coordinate with other stake holders such as KRKs and its TSA, related agtech service providers, API aggregators, loan management system provider, NABARD, RBI etc as required

Currently following three DPI platforms are being used and could be leveraged for eKCC implementation under UP-AGREES:

Public Tech Platform for Frictionless Credit of RBIH

As part of the Statement on Developmental and Regulatory Policies released on August 10, 2023, Reserve Bank of India (RBI) has announced the development of a Public Tech Platform for Frictionless Credit. The Platform is being developed by Reserve Bank Innovation Hub (RBIH), a wholly owned subsidiary of RBI. The Public Tech Platform would enable delivery of frictionless credit by facilitating seamless flow of required digital information to lenders and will focus on products such as Kisan Credit Card.

A pilot was conducted with a few banks in the last year and likewise similar other public good digital platforms have emerged for digital KCC such as a platform led by NABARD and the Jansamarth Platform led by SIDBI, BoB and other banks. Some Banks like SBI are in the process of setting up their own eKCC model.

NABARD eKCC platform

The NABARD eKCC platform provides a digital platform for the complete credit life cycle for the application of KCC for crops and animal husbandry, integrates with Aadhaar, land and credit history data for ease of application, and provides a real-time dashboard. The portal completed successful pilot projects for the onboarding of KCC. The NABARD eKCC platform process for KCC is as follows:

1. **Digital Application:** A streamlined e-application connecting farmers with their preferred bank to get agricultural credit.
2. **Instant pre-approval:** Enabling farmers to get the in-principal sanction instantly from a bank of their choice.
3. **Faster sanction and disbursement:** Faster loan approval and disbursement procedures making the entire process more effective.

Evolving policy, regulation and technology changes may bring about new DPI models and tech stacks etc in due course and UP-AGREES will align with emerging needs and solutions, as feasible

Table 71: e-KCC key output/performance indicators

Sr No	Component (Indicator) / Year	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	Total
1	No. of beneficiaries supported through eKCC (lakhs)		3.00	5.00	8.00	4.00	3.00 (renew)	20.00

Table 72: e-KCC Budget

Number of eKCC issued	Approx. Fund/unit (Rs.)	Aggregate value Rs cr
2000000	400	80 cr

Structure of Agri-Finance Team

The Agri-Finance Team under the State level Project Management Unit (PMU) will follow the below structure:

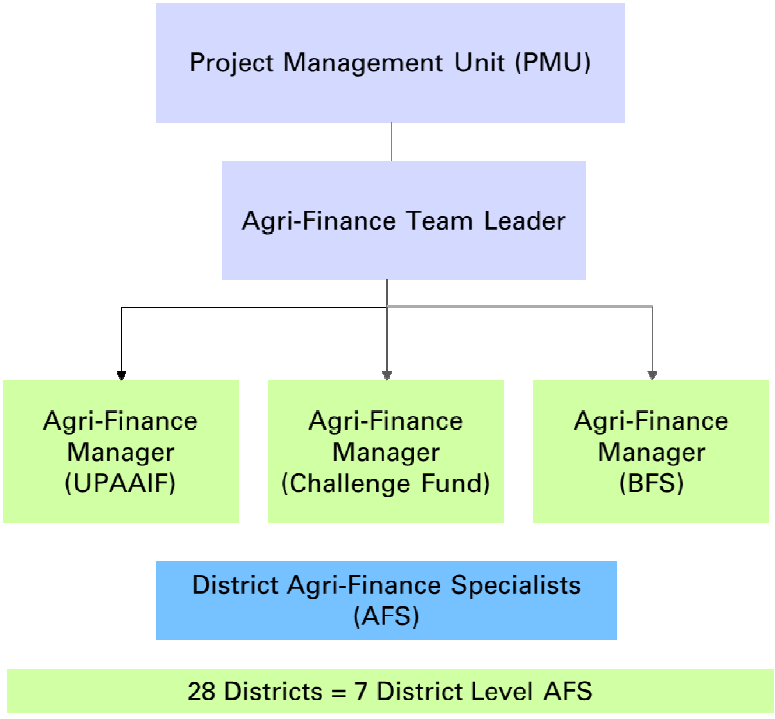


Figure 35: Structure of Agri Finance team

Role of Agri-Finance Specialist (ASF) (team leader)

- The Agri-Finance Specialist Team Leader (AFS TL) will contribute to the design, development and implementation of Agri Finance subcomponent covering its strategy and scope as defined in the project documents (specifically, PAD and PIP). Additionally, the ASF will contribute to development of Agri-Finance (AgFin) component of the World Banks PAD note and GoUPs UP-AGREES PIP document in coordination with UP-AGREES PD and Team.
- The AFS TL will support AFMs in conducting the study on the existing AgFin landscape (demand and supply side) in UP and specifically in the project districts to understand the gaps in the existing financial offerings and devise suitable strategies to plug in those gaps under the:
    - Uttar Pradesh Agribusiness Alternate Investment Fund (UPAAIF)
    - Challenge Fund
- AFS TL will also understand need for adaptation of existing financial products to suit the needs of target farmers and other actors in the value chain.
- AFS TL will support in completion of ongoing studies under the project being undertaken by selected Technical Support Organization(ies) (TSA) and coordinate and monitor activities of the TSA.
- AFS TL will provide support to district level team for building partnerships with stakeholders in the AgFin industry including lenders, insurance players, agri-tech and allied institutions for the promotion of access to finance through UPAAIF and Challenge Fund that seek to deliver appropriate and affordable non-financial or financial services.
- AFS TL will be responsible for driving the Agri finance sub component and managing various instruments, products/schemes developed during the preparation period. AFS is expected to coordinate with vendors and district-level team members, partners etc for the execution of the activities.
- AFS TL will monitor implementation progress for the indicators in the results framework
- AFS TL will be the first touch point for the sub-projects for all communication between UP-AGREES World Bank TTL and the team on Agri Finance sub component.

Role of Agri-Finance Manager (AFM) for Uttar Pradesh Agribusiness Alternate Investment Fund (UPAAIF)

- The UPAAIF Agri-Finance Manager will contribute to the design, development and implementation of UPAAIF, covering its strategy and scope as defined in the project documents.
- The AFM-UPAAIF will study the existing AgFin landscape (demand and supply side) in UP and specifically in the project districts to understand the gaps and design the UPAAIF for credit linkage to plug these gaps.

- The AFM-UPAAIF will be responsible for the implementation of UPAAIF, specifically for selection process of fund managers, conducting feasibility study, hiring a local counsel, signing of the grant agreement etc.
- AFM will be expected to coordinate AFS TL and district level team to monitor implementation progress for the indicators in the results framework.

Role of Agri-Finance Manager (AFM) for Challenge Fund

- The Challenge Fund Agri-Finance Manager will contribute to the design, development and implementation of the challenge fund, covering its strategy and scope as defined in the project documents.
- The AFM-Challenge Fund will study the existing AgFin landscape (demand and supply side) in UP and specifically in the project districts to understand the gaps and bridge credit linkage gaps through Challenge Fund.
- The AFM-Challenge Fund will be responsible for the implementation of Challenge Fund and supervise the work of the TSA and monitor project activities, which includes (i) overseeing hiring of TSA and Challenge Fund Evaluation Committee; (ii) monitor development of call for proposals; and (iii) facilitate grant agreements, among others.
- AFM-Challenge Fund will be expected to coordinate between the AFS TL, TSA and district level team to monitor implementation progress for the indicators in the results framework.

Role of District Agri-Finance Specialists (atleast 7 in number /1 per division covering 28 districts and may be increased depending upon size of district and practicality of span of control).

- Each district AFS will be responsible for providing implementation support in 4 project districts for the implementation:
    - Uttar Pradesh Agribusiness Alternate Investment Fund (UPAAIF)
    - Challenge Fund
- District AFS will be responsible for building partnerships with stakeholders in the AgFin industry including lenders, insurance players, agri-tech and allied institutions for the promotion of access to finance that seek to deliver appropriate and affordable non-financial or financial services at the district level.
- The district AFS will oversee process of implementation and provide implementation support under the Challenge Fund in each district for activities including, but not limited to overseeing of outreach and implementation activities of Challenge Fund Grantees
- The district AFS will be expected to coordinate with AFM, AFS TL and beneficiaries for the execution of the activities.

Component 4: Project Management, Learning and Partnerships

The objectives of this component are to develop management and monitoring systems, enhance staff capacity for effective and efficient implementation of project activities, and develop partnerships with key national and global public and private sector organizations.

Project Management

The project will invest in refurbishing office spaces and setting up a Project Management Unit (PMU) to oversee the implementation on the field. The on-field implementation, dissemination of information and knowledge sharing at the district and block levels will be carried out by the project and support organization (SO) staff.

STATE LEVEL INSTITUTIONAL AND IMPLEMENTATION ARRANGEMENTS

The project will be managed and implemented by the Uttar Pradesh Diversified Agricultural Support Project (UPDASP) Society. UPDASP is a semi-autonomous GoUP agency with flexibility in administrative and financial procedures. The overall responsibility will lie with the Project Coordinator (PC), UPDASP. At the State level, a Project Management Unit (PMU), headed by the Project Director, a senior level officer from the All India Administrative Service (IAS), will be set-up. The PMU will have technical and managerial staff, and be supported by line departments, universities / institutes and technical support agencies contracted for the project period.

Project oversight will be provided by two committees that already exist at the state level, viz. Project Steering Committee (PSC) and the Project Executive Committee (PEC). PSC is a high-level body chaired by the Chief Secretary of Uttar Pradesh and composed of Additional Chief Secretaries, Principal Secretaries, and Secretaries from key departments such as Agriculture, Horticulture, Fisheries, Planning, Finance, MSME, among others. This diverse group of top officials ensure a broad spectrum of policy decisions, expertise, and insights, vital for the strategic oversight of the project. The PEC, with the Agriculture Production Commissioner (APC) as the chairperson and Secretaries of the participating line departments as members, will approve annual work plans, and address implementation issues including resolution of inter-departmental concerns.

At the district level, a District Coordination committee, headed by the District Magistrate, will be set up. Each district will have a District Project Manager, to manage the District Project Implementation Unit (DPIU). A Support organization (SO) will be inducted to assist with implementation of the project up to the village level. The PMU and DPIU will be duly supported by various institutions of repute.

Further, at each cluster identified in Component 2A, a separate commodity specific Cluster Planning and Implementation Team (CPIT) will be deployed that will provide end to end support for the entire value chain development. The CPIT will report to the PMU and will keep the concerned DPIUs apprised of the cluster activities.

State Project Management Unit

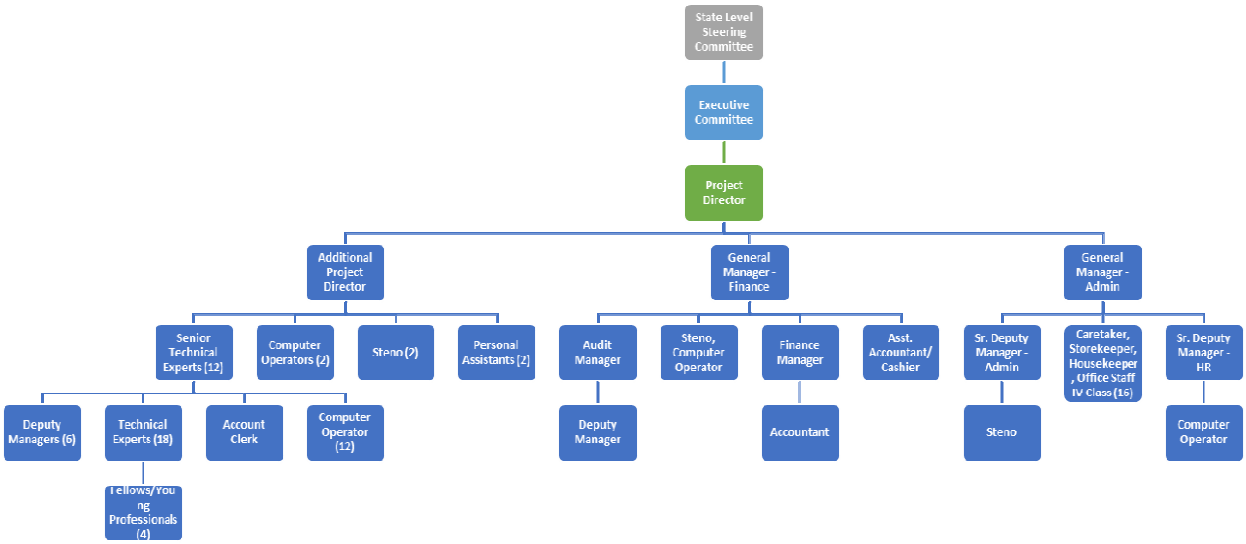


Figure 36: State Project Management Unit (PMU) organogram

The project will be implemented by the **Uttar Pradesh Diversified Agricultural Support Project (DASP) Society**, with the following implementation structure:

Project Steering Committee (PSC)

A high-level body chaired by the Chief Secretary of UP and composed of Additional Chief Secretaries, Principal Secretaries, and Secretaries from key departments including Agriculture, Horticulture, Fisheries, Planning, Finance, MSME, among others. This diverse group of top officials will ensure a broad spectrum of policy decisions, expertise, and insights, vital for the strategic oversight of the project. The Steering Committee will review the project activities on bi-annual basis and provide necessary guidance.

Details of members of this Committee and responsibilities are out lined below:

Table 73: Project Steering Committee Composition

1	Chief Secretary	Uttar Pradesh	Chair person
2	Agriculture Production Commissioner	Uttar Pradesh	Member
3	Additional Chief Secretary (ACS)/Principal Secretary	Agriculture	Member
4	Additional Chief Secretary (ACS)/Principal Secretary	Horticulture	Member
5	Additional Chief Secretary (ACS)/Principal Secretary	Planning	Member
6	Additional Chief Secretary (ACS)/Principal Secretary	Finance	Member
7	Additional Chief Secretary (ACS)/Principal	Fisheries	Member

	Secretary		
8	Additional Chief Secretary (ACS)/Principal Secretary	Marketing/Mandi	Member
9	Additional Chief Secretary (ACS)/Principal Secretary	MSME	Member
10	Additional Chief Secretary (ACS)/Principal Secretary	Rural Development	Member
11	Director General	UP CAR	Member
12	Director	Agriculture	Member
13	Director	Horticulture	Member
14	Director	Fisheries	Member
15	Director	Mandi/Marketing	Member
16	Special Invitees		
17	Project Director UP-AGREES		Member Secretary

The roles and responsibilities of Project Steering Committee

a) Provide conceptual, strategic and policy guidance for the design and implementation of the project activities.
b) Approve Annual Work Plan, Budget and ensuring adequate budget provision for the activities.
c) Review the progress and approve changes needed to improve project performance.
d) Guide inter-departmental convergence and co-ordination.
e) Review and resolve the issues arising out of field implementation.
f) Issue guidelines if required to enhance project performance.
g) Will be the final authority for conflict resolutions under the project.

Project Executive Committee (PEC)

This committee will be chaired by the Agriculture Production Commissioner (APC). The Secretaries of the participating line departments will be the members. The committee will approve annual work plans, and address implementation issues including resolution of inter-departmental concerns.

Table 74: Project Executive Committee Composition

1	Agriculture Prod. Comm.		Chairperson
2	Add. Chief Secretary (ACS)	Agriculture	Member
3	ACS/ Principal Secretary	Horticulture	Member
4	ACS/ Principal Secretary	Planning	Member
5	ACS/ Principal Secretary	Finance	Member
6	ACS/ Principal Secretary	Fisheries	Member
7	ACS/ Principal Secretary	Marketing/Mandi	Member
8	ACS/ Principal Secretary	MSME	Member
9	ACS/ Principal Secretary	Rural Development	Member

10	Director General	UP CAR	Member
11	Director	Agriculture	Member
12	Director	Horticulture	Member
13	Director	Fisheries	Member
14	Director	Mandi/Marketing	Member
15	Special Invitees	E.g. Agriculture Universities/ Research Institutions / Eminent Persons	Member
16	Project Director UP-AGREES		Member Secretary

Roles and Responsibilities of Project Execute Committee (PEC)

a) The PEC under the chairmanship of Agriculture Production Commissioner of state shall meet at least once in a quarter i.e. minimum 04 meetings in a year.

b) PEC will review the progress of implementation of the detailed Annual Action Plan (AAP) as prepared and executed by various Senior Technical Experts/ line agencies/Research partners market agencies, under the leadership and guidance of Project Director, UPAGREES.

c) PEC will ensure necessary inter departmental coordination and convergence so that maximum output is achieved and replication is avoided.

d) PEC will regularly monitor and review the component wise physical and financial progress every quarter.

e) For developing a sound digital agriculture governance structure, PEC will provide strategic directions, make recommendation, resolve strategic and inter department collaboration issues, ensure data sharing among departments, and oversee alignment with broader objectives of the digital agriculture ecosystem and service delivery platform.

f) In UPAGREES, sector wise productivity and production targets have been kept annually. PEC will regularly review these targets. In case, targets are not achieved in any sector, state PMU will prepare and present in PEC a revised strategy to timely bridge the gaps.

g) Reimbursement claims to be sent to World Bank will be regularly monitored and reviewed by the PEC.

Project Management Unit (PMU)

The PMU, established under the project, will be headed by the 'Project Director', a senior level officer from All India Administrative Service (IAS). The overall direction and guidance to the project will be provided by the Project Director. The PMU will have a team of Technical Experts, Managers and Support Staff. The PMU will also have support of Technical Support Agencies for specific project related fields.

Role of Project Management Unit (PMU)

a. Overall leadership, control, monitoring, supervision and support of the project activities.

b. PMU will co-ordinate and facilitate the implementation of the project on regular basis.
c. Ensuring implementation of Govt. orders and to make fund available to the field units/functionaries.
d. Ensuring timely submission of reports to GoUP, DEA GoI and World Bank.
e. Ensuring deployment of field staff, resource agencies, services providers and other functionaries.
f. Coordination with Agriculture & allied department at state level.
g. Ensuring consolidation of the annual work plan and budget of various units for submission to the state for sanction of the Budget.
h. Ensuring approval of annual work plan and budget..
i. Ensure convergence with ongoing schemes of state and central government.
j. Ensuring timely distribution of the funds to various field units and service providers as per the physical and financial targets and other deliverables.
k. To submit Consolidated Statement of Expenditure to the World Bank for reimbursement of Claims.
l. To monitor the activities and progress of works in project.
m. To provide necessary guidance and coordination and ensure proper implementation of the Project.
n. Ensure Conflict resolution and grievances redressal.
o. Signing of all the contracts, MoUs and Productive Partnerships between UP-AGREES Project and various organizations.
p. PMU will monitor the progress of the project and coordinate with Agriculture & allied departments to attain the proposed physical and fiscal targets thereby ensuring a continuous and steady progress in the project.
q. PMU will address the difficulties faced during the implementation of the project with concerned departments and seeks the guidance from the Steering Committee for policy, convergence and state level issues.
r. PMU will periodically appraise the progress of the project to the Steering Committee.
s. The personnel in the PMU assists and guides the DPIUs in the matters like procurement, market design, environment, and social development.
t. The PMU will maintain the records/accounts of the projects and get it audited every year.
u. Any other matter related to implementation of UP-AGREES Project.
v. PMU will be authorized to make rules and regulations or amend them for the conduct of the affairs of state PMU and District PMU, from time to time.
w. PMU will approve all the required changes in policy guideline before sending it to state steering committee for final approval.

Table 75: Details of Personnel in the PMU[32]

Position	#	Will report to whom?	Key Responsibilities	Qualification	Where will the position be recruited from?
Project Director	1	Executive Committee	Overall responsibility of project implementation and coordination	-	Senior IAS officer (dedicated / full time)
Additional Project Director	1	Project Director	Technical Head for project implementation and coordination	M Sc Ag in Agriculture / MBA Agri business /Agri Marketing with 20 Years of experience	Joint / Addl. Director Agriculture on Deputation or from Open Market
General Manager - Finance	1	Project Director	Financial Management Head of the Project	Finance Controller / Sr. Finance & Accounts officer	on Deputation
General Manager - Admin	1	Project Director	General Administration, H R and Personal management	MBA /Master degree in Public Administration	Deputation / Open market
Senior Technical Expert - Agriculture	2	Additional Project Director	Planning and implementation of productivity enhancement activities and coordination with Agriculture and allied departments	M Sc Ag in Agriculture / MBA Agri business /Agri Marketing with 15 years of experience	Open market (till project duration)
Senior Technical Expert - Agribusiness	2	Additional Project Director	Support market led production PHM, Value Addition and Marketing activities	M Sc Ag in Agriculture / MBA Agri business /Marketing with 15 years of experience	Open market (till project duration)
Senior Technical Expert - Fisheries	1	Additional Project Director	Work closely with DOF / ICAR / SAUs for seed, feed, and production of fisheries sector	Master degree in Fisheries science or MSc. Zoology with specialisation in Fisheries with 15 years of experience	Open market (till project duration)
Senior Technical Expert - Agri-Finance	1	Additional Project Director	Credit linkage for Crop production, PHM, Value addition, Marketing & Exports	M Sc Ag in Agriculture Economics / MBA Finance /Agri business with 15 years of experience	Open market (till project duration)
Senior Technical Expert - Digital Development	1	Additional Project Director	Development of Digital interventions and Implementation in project	Master degree in Computer application / Telecommunications / Computer science with 15 years of experience	Open market (till project duration)
Senior Technical Expert - Environment	1	Additional Project Director	Environmental assessment, Advice & guidance on environment aspect.	Master degree in Environment, Ecology, Nature protection and Agriculture science with 15 years	Open market (till project duration)

[32] The proposed structure of open market hired personnel may be modified with the engagement of technical support Agencies and as per requirement of the activities under the project life cycle.

Position	#	Will report to whom?	Key Responsibilities	Qualification	Where will the position be recruited from?
				of experience	
Senior Technical Expert - Social Development	1	Additional Project Director	Assessment, Planning and Execution of social safeguards, Strengthen PGs/ FPOs.	Master degree in Social Sciences with 15 years of experience	Open market (till project duration)
Senior Technical Expert - Monitoring & Evaluation	1	Additional Project Director	Responsible for overall progress monitoring and Evaluation of the project	Master degree in Statistics / Mathematics / Economics with 15 years of experience	Open market (till project duration)
Senior Technical Expert -Knowledge Management and Communications	1	Additional Project Director	Case studies, Publications, Digital Communication products, & Social marketing	Master degree Development Journalism / Mass communication with 15 years of experience	Open market (till project duration)
Senior Technical Expert - Procurement	1	Additional Project Director	Manage all procurements of the projects end to end for works, goods, consulting & non-consulting services	MBA in Finance / Business Administration or Law Graduate with 15 years of experience	Open market (till project duration)
Technical Expert - Agriculture	2	Senior Technical Expert - Agriculture	Planning and implementation of climate smart agri-productivity enhancement activities Agriculture and Horticulture crops	M Sc Ag in Agriculture or B Tech in Agriculture Engineering with 05 Years of experience in relative field	Open market (till project duration)
Technical Expert - Agribusiness	2	Senior Technical Expert - Agribusiness	Support market led production of Agri-Horti crops, Post Harvest Management, Value Addition and Marketing & Export of Agri produce	M Sc Ag in Agriculture Economics / MBA in Agri business /Marketing / B. Tech in Agriculture Eng. with 05 Years of experience	Open market (till project duration)
Technical Expert - Fisheries	2	Senior Technical Expert - Fisheries	Coordination with DOF / ICAR / SAUs for seed, feed and production of fisheries sector	M. Sc Zoology (specialisation in fisheries) or PG Diploma (1 Year) or Graduate in Fisheries science with 05 Years of experience	Open market (till project duration)
Technical Expert - Digital Development	3	Senior Technical Expert – Digital Development	Development of Digital interventions and Implementation in project	Master degree in Computer application / Telecommunications / Computer science with 05 years of experience	Open market (till project duration)
Technical Expert - Agri-Finance	2	Senior Technical Expert – Agri-Finance	Credit linkage for Crop production, PHM, Value addition, Marketing & Exports	M Sc Ag in Agriculture Economics / M Com / MBA Finance /Agri business with 05 Years of experience	Open market (till project duration)

Position	#	Will report to whom?	Key Responsibilities	Qualification	Where will the position be recruited from?
Technical Expert - Environment	1	Senior Technical Expert – Environment	Environmental assessment, Advice & guidance on environment aspect.	Master degree in Environment, Ecology, Nature protection and Agriculture science with 05 years of experience	Open market (till project duration)
Technical Expert - Social Development	1	Senior Technical Expert – Social Development	Assessment, Planning and Execution of social safeguards, Strengthen PGs/ FPOs.	Master degree in Social Sciences with 05 years of experience	Open market (till project duration)
Technical Expert - Monitoring & Evaluation	2	Senior Technical Expert – M & E	Assist in overall progress monitoring and Evaluation of the project	Master degree in Statistics / Mathematics / Economics with 05 years of experience	Open market (till project duration)
Technical Expert - Knowledge Management and Communications	2	Senior Technical Expert - Communication	Case studies, Publications, Digital Communication products, & Social marketing	Master degree Development Journalism / Mass communication with 05 years of experience	Open market (till project duration)
Technical Expert - Procurement	1	Senior Technical Expert - Procurement	Manage all procurements of the projects end to end for works, goods, consulting & non-consulting services	MBA in Finance / Business Administration or M Com or Law graduate with 05 years of experience	Open market (till project duration)
Finance Manager	1	General Manager - Finance	Management of all financial transaction as per standard procedures and financial manual of the project.	MCom / MBA Finance with 05 years of experience in related field.	Open market (till project duration)
Audit Manager	1	General Manager - Finance	Assist. in auditing of the financial records as per relevant procedures and project manual.	MCom / MBA Finance with 05 years of experience in related field.	Open market (till project duration)
Sr. Deputy Manager - Admin	1	General Manager - Admin	Assist in general Administration, office management	Graduate with 05 years of experience in office administration field.	Open market (till project duration)
Sr. Deputy Manager - HR	1	General Manager - Admin	Assist in H R and Personal management	Graduate with 05 years of experience in HR and Personal management.	Open market (till project duration)
Deputy Manager - System	2	Senior Technical Expert – Digital Development	Assist in MIS / Data feeding\ File management and report preparation.	Graduate with O Level diploma in computer course or equivalent with 03 years of experience in related field.	Open market (till project duration)

Position	#	Will report to whom?	Key Responsibilities	Qualification	Where will the position be recruited from?
Deputy Manager – Social development	2	Senior Technical Expert – Social Development	Assessment, Planning and Execution of social safeguards, Strengthen FPGs/ FPOs.	Master degree in Social Sciences with 03 years of experience in related field.	Open market (till project duration)
Deputy Manager – Environment	1	Senior Technical Expert – Environment	Carbon emission mapping, GIS based environment safeguards and Carbon mapping.	Master degree in Environment or Agriculture science or Remote sensing with 03 years of experience in related field.	Open market (till project duration)
Fellows / Young Professionals	4	Respective Senior Technical Experts			Open market (till project duration)
Deputy Manager – Procurement	1	Senior Technical Expert - Procurement	Assist in procurements activities and file management of the project.	M Com with computer knowledge and 03 years of experience	Open market (till project duration)
Deputy Manager – Audit	1	Manager - Audit	Assist in auditing of the financial records and file management as per relevant procedures and project manual.	M Com / MBA Finance with 03years of experience in related field.	Open market (till project duration)
Accountants	1	Finance - Manager	File management of all financial transaction as per standard procedures and financial manual of the project.	B Com / MBA Finance with 03 years of experience in related field.	Open market (till project duration)
Personal Assistant	2	PD & APD	Assist in office and file management, typing and report generation.	Graduate with Diploma in Stenography and typing speed in Hindi & English as per GoUP norms with 05 years of experience.	Open market (till project duration)
Assistant Accountant cum Cashier	1	GM- Finance	Assist in file management of all financial transaction as per standard procedures and financial manual of the project.	B Com with computer knowledge and 03 years of experience	Open market (till project duration)
Steno	4	PD /APD / GM Finance / GM Admin.	Assist in office & file management, typing and report preparation.	Graduate with Diploma in Stenography and typing speed in Hindi & English as per GoUP norms with 03 years of experience.	Open market (till project duration)
Account Clerk	1	Senior Technical	Assist in procurement activities and	Graduate with computer	Open market (till project

Position	#	Will report to whom?	Key Responsibilities	Qualification	Where will the position be recruited from?
		expert - Procurement	file management as per standard procedures & project manual.	knowledge and 02 years of experience in related field.	duration)
Computer Operator	16	PD/APD/GM/All Sr. Tech. Experts	Assist in MIS / data feeding, file management and report preparation.	Graduate with O level diploma in Computer course or equivalent with 02 years of experience	Open market (till project duration)
Caretaker	1	General Manager - Admin	General management of office, required arrangements for meetings, guests, visitors etc.	Graduate with 02 years of experience in related field.	Open market (till project duration)
Storekeeper	1	General Manager - Admin	Maintenance and record keeping of assets and office inventory.	Graduate with 02 years of experience in related field.	Open market (till project duration)
Housekeeper	1	General Manager - Admin	Cleaning and upkeep of office premises.	High School with 02 years of experience in related field.	Open market (till project duration)
Office Staff (IV class)	16	General Manager - Admin	Office maintenance and general work.	High School with 02 years of experience in related field.	Open market (till project duration)
Total	**98**				

District and Block Level Implementation Arrangements

District Project Implementation Unit (DPIU)

The DPIU will be headed by the District Project Manager. A District Coordination Committee (DCC), chaired by the District Magistrate, will be set up to monitor the project activities at the district level and to facilitate linkages and convergence with other government schemes. A Support Organization (SO) will be hired to assist with implementation at the block level. One SO will be hired for each district making it a total of 28 SOs that will be hired for the implementation of UP-AGREES. The selection of the SOs will be done using a competitive selection process following World Bank procurement guidelines and GoUP guidelines.

A DCC, led by the District Magistrate or Chief Development Officer, will be responsible to carry out the planning, implementation and monitoring of Annual Action Plan. DCC will have following members: -

1	District Magistrate / Chief Development Officer	Chairperson
2	Deputy Director Agriculture	Member
3	In-charge Krishi Vigyan Kendra	Member
4	District Agriculture Officer	Member
5	District Horticulture Officer	Member
6	Plant Protection Officer	Member
7	Bhoomi Sarankshan Adhikari	Member
8	Assistant Director / District In-charge Fisheries	Member
9	Lead Development Manager, Lead Bank	Member
10	District Development Manager, NABARD	Member
11	GM District Industry Centre	Member
12	Sachiv Krishi Utpadan Mandi Samiti	Member
13	FPOs Representative	Member
14	Progressive Farmers – Agriculture, Horticulture & Fisheries	Member
15	Progressive Women Farmer / Entrepreneur	Member
16	Project Manager, UP-AGREES	Member/Secretary

Roles and responsibilities of District Coordination Committee (DCC):

It is proposed that DCC shall be having tentatively following role and responsibilities in implementation of the project:

1. DCC under chairmanship of District Magistrate will organise quarterly meeting i.e. minimum 04 meetings in a year.
2. DCC will approve the Annual Action Plan (AAP) prepared by DPIU, based on inputs from various district level implementing agencies and under the guidance of State PMU. Yearly targets and implementation strategy provided in the PIP of UPAGREES will form the basis of district level AAP.
3. DCC will regularly monitor and review the physical and financial progress of project activities being implemented by various implementing agencies and DPIU.
4. DPIU is the key unit to support ICT operations at district level and supposed to coordinate data collection, organise capacity building of all allied departments on apps usage, monitoring of data submission and coordination with PMU digital help desk. DCC will ensure development of digital program at district level.

5. DCC will monitor the distribution of inputs and its utilization at farmers and FPGs level.
6. DCC will ensure convergence with all the relevant scheme implemented by various line department/agencies.
7. DCC will ensure that FPGs & Women FPGs are properly developed and linked with existing or newly developed FPOs for input arrangement, technical assistance and marketing of their produce.
8. DCC will coordinate all support to link the FPGs/WFPGs/FPOs to the financial institutions for credit support to them.
9. DCC will approve the Business Plan of each FPO under UP-AGREES.
10. Under supervision of DCC and support from state PMU, DPIU will develop Business Plan of each FPO under the project. To assess the market potential, DPIU will conduct proper assessment study of market potential of the district. It will list the potential traders and other market agencies or companies which will be linked to FPOs for purchase of their produce.
11. DCC will also approve the Capacity Building Plan of all farmers/FPGs/FPOs as per required quality parameters/norms of market/traders/market agencies. Capacity Building Plan will include all the quality parameters required for production as per market standards.
12. DCC will also guide on export related activities of FPOs produce.
13. DCC will regularly monitor and ensure that DPIU and all the districts level implementing agencies maintain proper accounts as per guidelines issued.
14. DCC will also ensure that the support organization and their staff is properly placed in the field and assisting the project activities right from group formation to marketing of the agriculture/aquaculture output.
15. DCC will ensure that all the implementing agencies timely submit their financial reports for audit.
16. DCC will also address the difficulties faced by the implementing agencies during implantation phase and may seek guidance from State Executive Committee as and when required.

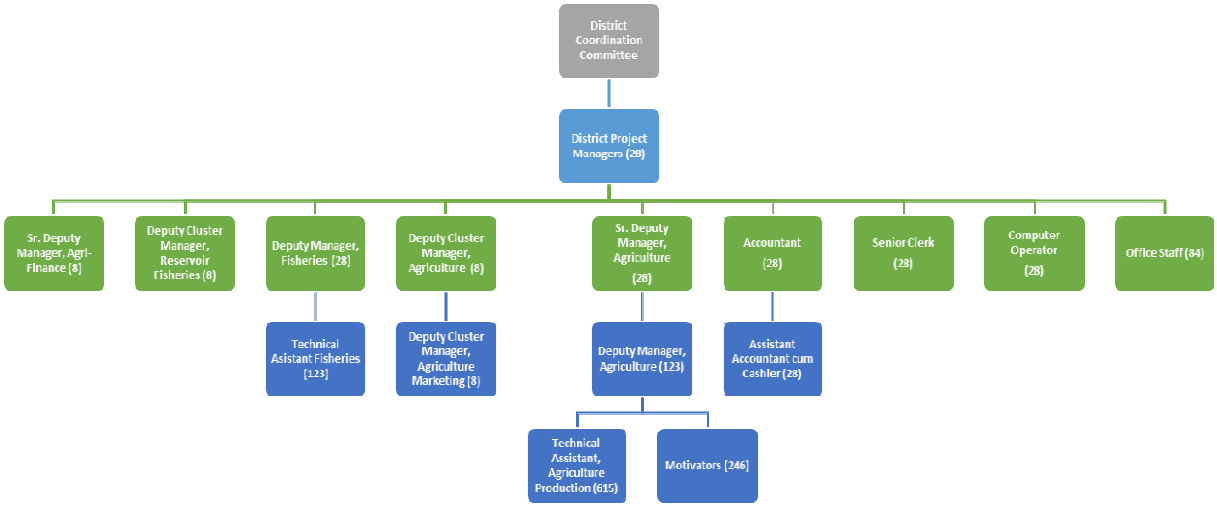


Figure 37: District Project Implementation Unit (DPIU) organogram

Table 76: Details of personnel in the DPIUs[33]

Position	#	Will report to whom?	Key Responsibilities	Qualification	Where will the position be recruited from?
District Project Manager	28	District Coordination Committee	Overall responsibility of project implementation and coordination with line departments in District.	Graduate in Agriculture / Horticulture with 05 years of experience.	On Deputation - District Agriculture Officer / Class II officer from Horticulture / Scientists from SAUs.
Sr. Deputy Manager -Agriculture	28	District Project Manager	Planning and implementation of climate smart agri-productivity enhancement activities Agriculture and Horticulture crops	Graduate in Agriculture / Horticulture on Deputation / Departmental with 05 years of experience	On Deputation - Group II level officials from Agriculture / Horticulture / SAUs / Open Market
Deputy Manager - Fisheries	28	District Project Manager	Coordination with DOF / ICAR / SAUs for seed, feed, and production of fisheries sector	Bio-Science Graduate with 05 years of experience in Fisheries sector	Support Organization / Open market (till project duration)
Sr. Deputy Manager - Agri Finance (1/division)	08	District Project Managers	Credit linkage for Crop production, PHM, Value addition, Marketing, and coordination with Banks / line departments	Graduate in Economics / B Com / Diploma in Agri business /Agri Marketing with 05 Years of experience	Open market (till project duration)
Accountant	28	District Project Manager	Management of all financial transaction as per standard procedures and financial manual of the project.	B Com with 03 years of experience in related field.	Deputation / Departmental
Assistant Accountant cum Cashier	28	District Project Manager	Management of all financial transaction as per standard procedures and financial manual of the project.	B Com with 02 years of experience in related field.	Open market (till project duration)
Dy. Cluster Manager – Agriculture (1/cluster)	08	District Project Manager / Senior Technical Expert - Agriculture	Development of commodity specific Agro-cluster in selected district	Graduate in Agriculture, 05years of experience in relative field	Open market (till project duration)
Deputy Cluster Manager - Agriculture Marketing	08	Cluster Manger – Agriculture / Senior	Implementation of PHM / Value addition / marketing commodity specific Agro-cluster in selected district	Graduate in Economics / B Com / Diploma in Agri business /Agri Marketing with 05 Years of	Open market (till project duration)

[33] The proposed structure in terms of supporting staff like TA's, clerical /office staff, computer operator, motivators may be modified/reduced as per need of the project and the work being done by Support Organisation.

Position	#	Will report to whom?	Key Responsibilities	Qualification	Where will the position be recruited from?
(1/cluster)		Technical Expert - Agribusiness		experience	
Deputy Cluster Manager – Reservoir Fisheries (1/division)	08	District Project Manager	Coordination with DOF / ICAR / SAUs for seed, feed and reservoir fisheries production.	Bio-Science Graduate with 05 years of experience in reservoir Fisheries production.	Support Organization / Open market (till project duration)
Senior Clerk	28	District Project Manager	Assist in office & file management, typing and report preparation	Graduate with 03 years of experience in related field.	Open market (till project duration)
Computer Operator	28	District Project Manager	Assist in MIS / data feeding, file management and report preparation.	Graduate with O level diploma in Computer course or equivalent with 02 years of experience	Open market (till project duration)
Office Staff	84	District Project Manager	Class IV employee (2 for office hours and I for night security)	High school pass	Open market (till project duration)
Deputy Manager – Agriculture (1/block)	123	Sr. Deputy Manager - Agriculture	Supervise the implementation of climate smart agri-productivity enhancement activities in Agriculture & Horticulture crops and strengthening of PGs/FPOs at block level.	Graduate in Agriculture / Horticulture on Deputation / Departmental with 10 years of experience	Support Organization / Open market (till project duration)
Technical Assistant – Agriculture Production (1 per village cluster)	615	DY. Manager Agriculture	Implementation of climate smart agri-productivity enhancement activities in Agriculture & Horticulture crops and strengthening of PGs/FPOs	Graduate in Agriculture / Horticulture on Deputation / Departmental with 05years of experience	Support Organization / Open market (till project duration)
Technical Assistant – Fisheries (1 per block)	123	Deputy Manager - Fisheries	Implementation of fisheries programs in selected blocks	Bio-Science Graduate with 02 Years of experience in Fisheries sector	Support Organization / Open market (till project duration)
Motivators	246	DY. Manager Agriculture	Motivation and awareness programme for FPGs / Women beneficiaries, promotion of livelihood activities and agribusiness in the block	Graduate with 03 years' experience in community mobilisation / group formation in agriculture / horticulture / fisheries / rural livelihood projects.	Support Organization / Open market (till project duration)
Total	**1419 for 28 DPIUS**				

Cluster Planning and Implementation Team (CPIT)

At each cluster identified in Component 2A, a separate commodity specific Cluster Planning and Implementation Team (CPIT) will be deployed that will provide end to end support for the entire value chain development. CPIT will report to the PMU and will keep the concerned DPIUs apprised of the cluster activities.

Project team capacity building

The project implementation framework is designed to promote a productive alliance between farmer groups, buyers, support agencies, District Project Implementation Units (DPIUs) at the district and PMU at the State level and in convergence with state departments. To improve the efficiency of the system and project staff, it is envisaged to implement an IT driven MIS system. Project partners shall have to use digital tools in the implementation of project activities.

UP-AGREES involves the participation of six departments viz: Agriculture, Horticulture, Fisheries, MSME, Agriculture Marketing and Mandi. Each of these departments is required to converge many of their ongoing schemes with farmers / farmer groups of the project area to multiply the impact of the project activities manyfold.

The project will augment the capacities of the project staff by partnering with training and research institutions and with reputed national and international, and state-level institutions to develop accredited training programs in agro-ecological farming, agribusiness management, enterprise promotion, agri-financing, for professionals working in the project. The project preparation activities will also include a review of international experience in agricultural innovation system reform in other regions, such as in the EU and US, with regard to development and adoption of sustainable adaptation technologies.

The gaps in the current technical capacity of the Department of Agriculture (DoA), Horticulture & Food Processing and Fisheries and their field functionaries will be assessed through a functional review of respective departments. The review will also provide constructive recommendations for organizational change to facilitate more efficient and effective service delivery and to identify core managerial and organizational barriers to better performance. Further, the project will carry out other administrative activities such as Monitoring, Learning and Evaluation (ML&E), Financial Management, Human resource development etc.

Inter Departmental Convergence

The high-level steering committee and Executive Committee shall provide strong convergence mandate for this project in the sense that the project is not being implemented in isolation but an additional catalytic investment for productivity enhancement, value

addition and productive partnership between farmer producers and Buyers. Convergence denotes the market-oriented bottom-up planning process from cluster up words through micro planning facilitated at District level to ensure dovetailing of existing interventions with need based, innovative components to be supported under the project.

The goals are increased productivity, increase market access and higher value share to small holder farmers. All opportunities around these objectives are to be tapped for all relevant agencies viz agriculture, horticulture, fisheries, marketing, SRLM, MSMEs etc. who have strong relationship with farming community, this project would serve as an ideal platform.

Monitoring, Learning & Evaluation (ML&E)

The project will develop a robust ML&E system to track project progress and outcomes. The project will hire agencies to carry out baseline, mid-term, annual, and project completion surveys and other studies as may be needed during project implementation. The project will also invest in developing and operationalizing a computerized MIS and a decision support system to capture data and generate performance reports.

The ML&E will leverage the digital platform established under the project to track the project's performance and will additionally comprise the following activities:

(i) **Impact Evaluation Involving Baseline Survey and Follow-Up Surveys**: The objective of the impact evaluation is to establish the 'net' contribution of the project to the farmer's profitability. The impact evaluation study will compare the 'before' and 'after' the project and between the project and control areas. In addition to capturing individual farmer-level outcomes, the impact evaluation will also assess the project's contribution to the performance of producer collectives, individual enterprises of the group-level and community-level changes brought about by the project.

(ii) **Concurrent Process Monitoring**: The project will undertake concurrent process monitoring to identify critical deviations in the project's implementation and provide continuous feedback to the Project Coordination Management Unit (PMU).

(iii) **Just-in-Time Assessments**: The project will collect qualitative data among beneficiaries regularly to assess whether it meets the beneficiaries' expectations, what they see as needing improvements or changes, and how the project impacts their lives beyond the PDO and intermediate indicators. In addition, the project will commission rapid assessments when needed.

Theory of Change

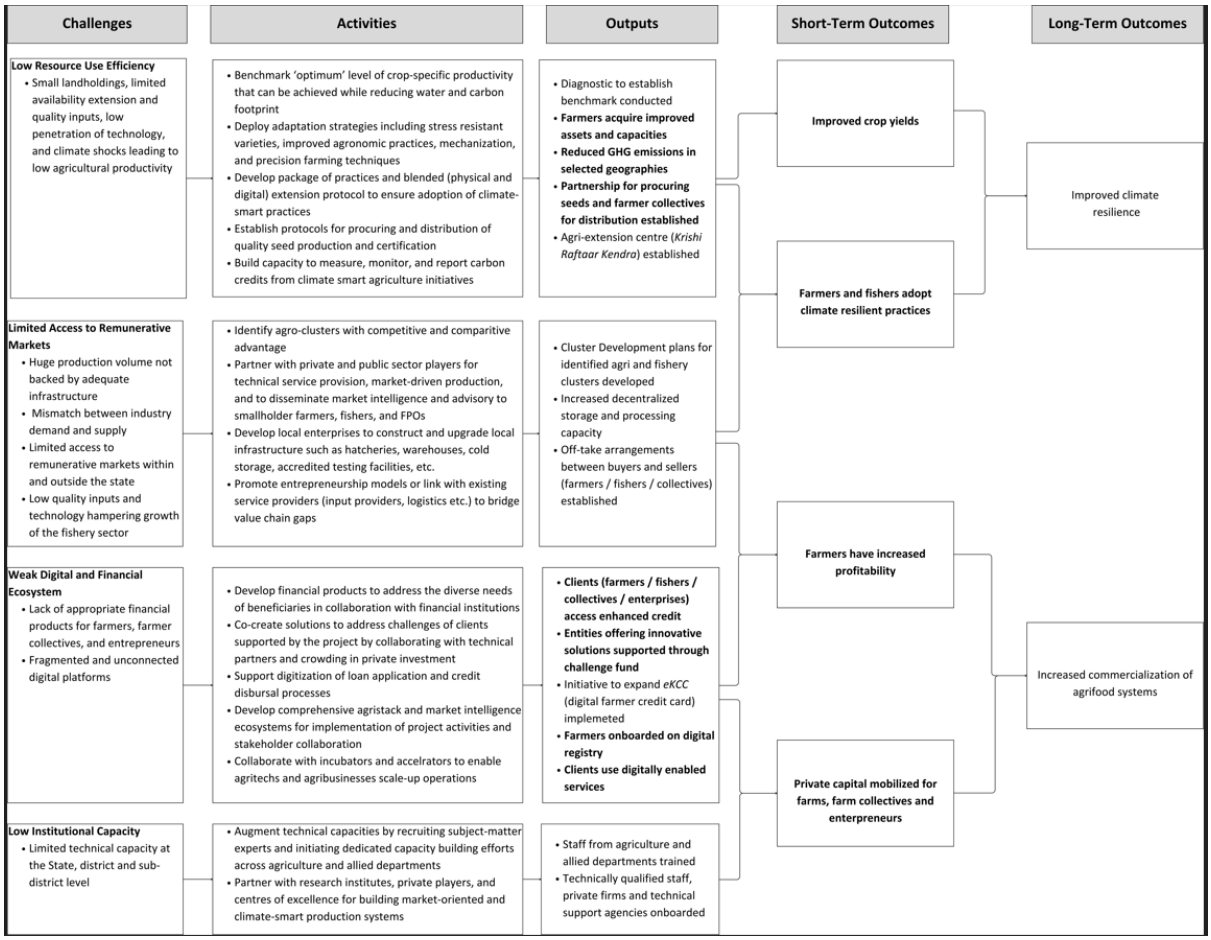


Figure 38: UP-AGREES Theory of Change

The key assumptions that underpin the project's results chain include:

(i) GoUP's commitment to implement the project

(ii) active leadership of the concerned government department(s) to foster an enabling environment for project implementation including the onboarding of required technical human resources, research institutes, and technical agencies

(iii) smallholder interest in participation and that they see value in adoption of productivity-enhancing and climate smart practices; and

(iv) interest of the private sector in taking up new or furthering existing entrepreneurial opportunities to set up agri-processing, storage, and logistics enterprises.

Results Framework

Table 77: Results Framework - PDO Indicators by PDO Outcomes

Baseline	Closing Period
Improved climate resilience	
Project beneficiaries adopting climate-resilient practices (Number)	
Jun/2024	Jun/2030
0	600000
Increase in average annual yield of select crops (Metric ton)	
Jun/2024	Jun/2030

0	0
ØRice (Metric ton)	
Jun/2024	Jun/2030
2.59	3.4
ØWheat (Metric ton)	
Jun/2024	Jun/2030
3.49	4.5
ØGram (Metric ton)	
Jun/2024	Jun/2030
1.37	1.85
ØMustard (Metric ton)	
Jun/2024	Jun/2030
1.17	2.0
Improve commercialization of agrifood systems	
Increase in profitability at the producer level (Percentage)	
Jun/2024	Jun/2030
0	25
Private capital enabled (Amount(USD))	
Jun/2024	Jun/2030
0	100000000

Table 78: Results Framework - Intermediate Indicators by Components

Baseline	Closing Period
Productivity Enhancement	
Farmers reached with agricultural assets or services (Number) CRI	
Jun/2024	Jun/2030
0	900000
Farmers reached with agricultural assets or services - Female (Number) CRI	
0	300000
Farmer collectives supported (Number)	
Jun/2024	Jun/2030
0	30000
Exclusive women-FPGs supported (Number)	
Jun/2024	Jun/2030
0	9000
Net GHG emissions (Tones/year)	
Jun/2024	Jun/2030
0	-290000
Commodity Clusters	
Farmers supported through agri-cluster interventions (Number)	
Apr/2024	Apr/2030
0	25000
Beneficiaries supported through fisheries interventions (Number)	
Apr/2024	Apr/2030
0	100000
Digital and Financial Ecosystems	
Beneficiaries reached with financial services (Number) CRI	
Jun/2024	Jun/2030
0	2000000
Number of SMEs with a loan or line of credit (Number) CRI	
Jun/2024	Jun/2030

0	50
Women-led SMEs access credit from formal financial institutions (Percentage)	
Jun/2024	Jun/2030
14	25
Challenge Fund proposals sanctioned (Number)	
Jun/2024	Jun/2030
0	20
People and businesses using digitally enabled services (Number)	
Jun/2024	Jun/2030
0	1000000
Adoption rate of digital marketplaces (Percentage)	
Jun/2024	Jun/2030
0	30
Farmers onboarded on the digital registry (Number)	
Jun/2024	Jun/2030
0	1000000
Project Management, Learning, and Partnerships	
Beneficiaries satisfied with project interventions (Percentage)	
Jun/2024	Jun/2030
0	80
Registered grievances addressed (Percentage)	
Jun/2024	Jun/2030
0	80

Monitoring & Evaluation Plan

Table 79: M&E Plan PDO Indicators by PDO Outcomes

Improved climate resilience	
Project beneficiaries adopting climate-resilient practices (Number)	
Description	This indicator measures the number of project beneficiaries adopting climate-resilient practices/set of climate-resilient practices introduced by the project.
Frequency	Baseline, mid-term and final assessment
Data source	Sample Survey
Methodology for Data Collection	Household surveys at the baseline, mid-term and end-term survey.
Responsibility for Data Collection	Survey Agency
Increase in average annual yield of select crops (Metric ton)	
Description	This indicator measures the average productivity gain in terms of the average percent increase in yield by project direct beneficiaries. Unit (Metric Tons/ year)
Frequency	Annual
Data source	Sample Survey
Methodology for Data Collection	Annual household surveys including at the baseline, mid-term and end-term survey.
Responsibility for Data Collection	Survey Agency
Rice (Metric ton)	
Description	This indicator measures the average productivity gain of paddy in terms of the average percent increase in yield by project direct beneficiaries. Unit (Metric Tons/ year)
Frequency	Annual
Data source	Sample Survey

Methodology for Data Collection	Annual household surveys including at the baseline, mid-term and end-term survey.
Responsibility for Data Collection	Survey Agency
Wheat (Metric ton)	
Description	This indicator measures the average productivity gain of wheat in terms of the average percent increase in yield by project direct beneficiaries. Unit (Metric Tons/ year)
Frequency	Annual
Data source	Sample Survey
Methodology for Data Collection	Annual household surveys including at the baseline, mid-term and end-term survey.
Responsibility for Data Collection	Survey Agency
Maize (Metric ton)	
Description	This indicator measures the average productivity gain of maize in terms of the average percent increase in yield by project direct beneficiaries. Unit (Metric Tons/ year)
Frequency	Annual
Data source	Sample Survey
Methodology for Data Collection	Annual household surveys including at the baseline, mid-term and end-term survey.
Responsibility for Data Collection	Survey Agency
Gram (Metric ton)	
Description	This indicator measures the average productivity gain of gram in terms of the average percent increase in yield by project direct beneficiaries. Unit (Metric Tons/ year)
Frequency	Annual
Data source	Sample Survey
Methodology for Data Collection	Annual household surveys including at the baseline, mid-term and end-term survey.
Responsibility for Data Collection	Survey Agency
Mustard (Metric ton)	
Description	This indicator measures the average productivity gain of mustard in terms of the average percent increase in yield by project direct beneficiaries. Unit (Metric Tons/ year)
Frequency	Annual
Data source	Sample Survey
Methodology for Data Collection	Annual household surveys including at the baseline, mid-term and end-term survey.
Responsibility for Data Collection	Survey Agency
Improve commercialization of agrifood systems	
Increase in profitability at the producer level (Percentage)	
Description	This indicator measures the increase in profit margins at the producer level due to increase in the value of the commodities sold by the producer and/or reduction in the cost of cultivation.
Frequency	Baseline, mid-term and final assessment
Data source	Project MIS
Methodology for Data Collection	Household survey at the baseline, mid-term and end-term survey.
Responsibility for Data Collection	Survey Agency

Private capital enabled (Amount(USD))	
Description	This indicator tracks all private investments made as a result of project interventions
Frequency	Quarterly
Data source	Project MIS and quarterly reports shared by DPIUs
Methodology for Data Collection	Project MIS
Responsibility for Data Collection	PMU

Table 80: Intermediate Results Indicators by Components

Productivity Enhancement	
Farmers reached with agricultural assets or services (Number) [CRI]	
Description	This indicator measures the number of farmers who were provided with agricultural assets or services as a result of World Bank project support. "Agriculture" or "Agricultural" includes: crops, livestock, capture fisheries, aquaculture, agroforestry, timber, and non-timber forest products. Assets include property, biological assets, and farm and processing equipment. Biological assets may include animal agriculture breeds (e.g., livestock, fisheries) and genetic material of livestock, crops, trees, and shrubs (including fiber and fuel crops). Services include research, extension, training, education, ICTs, inputs (e.g., fertilizers, pesticides, labor), production-related services (e.g., soil testing, animal health/veterinary services), phyto-sanitary and food safety services, agricultural marketing support services (e.g., price monitoring, export promotion), access to farm and post-harvest machinery and storage facilities, employment, irrigation and drainage, and finance. Farmers are people engaged in agricultural activities or members of an agriculture-related business (disaggregated by men and women) targeted by the project.
Frequency	Quarterly
Data source	Project MIS
Methodology for Data Collection	Project MIS
Responsibility for Data Collection	PMU
Farmers reached with agricultural assets or services - Female (Number) [CRI]	
Description	This indicator measures the number of female farmers who were provided with agricultural assets or services as a result of World Bank project support. "Agriculture" or "Agricultural" includes: crops, livestock, capture fisheries, aquaculture, agroforestry, timber, and non-timber forest products. Assets include property, biological assets, and farm and processing equipment. Biological assets may include animal agriculture breeds (e.g., livestock, fisheries) and genetic material of livestock, crops, trees, and shrubs (including fiber and fuel crops). Services include research, extension, training, education, ICTs, inputs (e.g., fertilizers, pesticides, labor), production-related services (e.g., soil testing, animal health/veterinary services), phyto-sanitary and food safety services, agricultural marketing support services (e.g., price monitoring, export promotion), access to farm and post-harvest machinery and storage facilities, employment, irrigation and drainage, and finance. Farmers are people engaged in agricultural activities or members of an agriculture-related business (disaggregated by men and women) targeted by the project.
Frequency	Quarterly
Data source	Project MIS
Methodology for	Project MIS

Data Collection	
Responsibility for Data Collection	PMU
Farmer collectives developed/strengthened (Number)	
Description	This indicator measures the number of farmer collectives supported through the project. Farmer collectives include Farmer Producer Groups (FPGs) and Farmer Producer Organizations (FPOs).
Frequency	Quarterly
Data source	Project MIS
Methodology for Data Collection	Project MIS
Responsibility for Data Collection	PMU
Women's representation in executive committees of Farmer Producer Groups (FPGs) (Number)	
Description	This indicator measures the number of exclusive women-farmer collectives supported through the project. Farmer collectives include Farmer Producer Groups (FPGs) and Farmer Producer Organizations (FPOs).
Frequency	Quarterly
Data source	Project MIS
Methodology for Data Collection	Project MIS
Responsibility for Data Collection	PMU
Net GHG emissions (Tones/year)	
Description	This indicator measures the reduced GHG emissions due to implementing Direct Seeded Rice (DSR) and Zero Tillage Wheat (ZTW) projects in select areas. The unit of analysis is tCO2eq per year.
Frequency	Annual
Data source	Satellite Data, Crop Model outputs
Methodology for Data Collection	Using IPCC validated methodologies
Responsibility for Data Collection	PMU with the support of IRRI
Commodity Clusters	
Farmers supported through agri-cluster intervention (Number)	
Description	This indicator measures the number of farmers supported through the agri-cluster interventions
Frequency	Quarterly
Data source	Project MIS
Methodology for Data Collection	Project MIS
Responsibility for Data Collection	PMU
Beneficiaries supported through fisheries intervention (Number)	
Description	This indicator measures the number of beneficiaries supported through the structured fishery interventions.
Frequency	Quarterly
Data source	Project MIS
Methodology for Data Collection	Project MIS
Responsibility for Data Collection	PMU
Digital and Financial Ecosystems	
Beneficiaries reached with financial services (Number) [CRI]	

Description	This number measures the beneficiaries reached with financial services
Frequency	Quarterly
Data source	Project MIS
Methodology for Data Collection	Project MIS
Responsibility for Data Collection	PMU
Number of SMEs with a loan or line of credit (Number) [CRI]	
Description	This number measures the number of MSMEs facilitated access to loan or line of credit
Frequency	Quarterly
Data source	Project MIS
Methodology for Data Collection	Project MIS
Responsibility for Data Collection	PMU
Women-led MSMEs access credit from formal financial institutions (Percentage)	
Description	The indicator measures the percentage of project supported women-MSMEs accessing credit from formal financial institutions (banks/NBFCs etc.)
Frequency	Quarterly
Data source	Project MIS
Methodology for Data Collection	Project MIS
Responsibility for Data Collection	PMU
Challenge Fund proposals sanctioned (Number)	
Description	The indicator measures the number of challenge fund proposals sanctioned by the project.
Frequency	Annual
Data source	Annual Reports
Methodology for Data Collection	Annual Reports
Responsibility for Data Collection	PMU
People and businesses using digitally enabled services and transfers (Number)	
Description	This indicator measures the total count of farmers actively using digital tools and services provided by the digital platform ecosystem for agriculture-related information, advisory services, and Agriculture/Horticulture/Fishery related benefits provided by the state and central governments.
Frequency	Quarterly
Data source	Project MIS
Methodology for Data Collection	Project MIS
Responsibility for Data Collection	PMU
Adoption rate of digital marketplaces (Percentage)	
Description	This indicator measures the proportion of farmers utilizing digital platforms for buying inputs and selling produce out of the total targeted farmer population.
Frequency	Annual
Data source	Sample Surveys
Methodology for Data Collection	Annual surveys including baseline, midline and end-term surveys
Responsibility for Data Collection	Survey Agency
Farmers onboarded on the digital registry (Number)	

Description	The indicator tracks the number of farmers added to the data registry of AgriStack (comprising farmer ID, GIS-based farm details, bank account details, and crop sown)
Frequency	Quarterly
Data source	Project MIS
Methodology for Data Collection	Project MIS
Responsibility for Data Collection	PMU
Project Management, Learning, and Partnerships	
Beneficiaries satisfied with project interventions (Percentage)	
Description	This indicator measures the proportion of beneficiaries who express satisfaction with the services provided in the project areas based on formal surveys.
Frequency	Annual
Data source	Sample Surveys
Methodology for Data Collection	Annual surveys including baseline, midline and end-term surveys
Responsibility for Data Collection	Survey Agency
Registered grievances addressed (Percentage)	
Description	The indicator measures the percentage of registered grievances addressed.
Frequency	Annual
Data source	Sample Surveys
Methodology for Data Collection	Annual surveys including baseline, midline and end-term surveys
Responsibility for Data Collection	Survey Agency

Partnerships

The component will invest in demonstrating innovative activities for subsequent scale-up by partnering with technical and research institutions at the state, national, and global levels (such as IITs, IIMs, IRRI, ICAR, CIP, NARS, NACS, etc.). The project will also facilitate incubation / acceleration of relevant agritech solutions for scale-up by partnering with Indian Institute of Technology. The project will also build complementarities with on-going Bank supported initiatives in such as UP Micro Irrigation Platform, Eastern corridor etc. The project in partnership with the 2030 WRG will leverage the private sector for technical assistance and mainstream market connects.

Knowledge Building and Demonstrations

The project will co-develop accredited training programs in agro-ecological farming, agribusiness management, enterprise promotion, agri-financing, and digital agriculture and AI for project staff as well as the concerned staff of agriculture and allied departments. The project will facilitate knowledge exchange with leading institutions in India and other countries / regions (such as Latin America, East Asia, European Union, South Korea, Australia, and the United States) for demonstrating new age technologies and concepts (stress tolerant varieties, digital agriculture, low carbon rice and wheat systems).

Component 5: Contingent Emergency Response Component (CERC)

The project will include CERC with a zero allocation at project approval. This arrangement shall permit a rapid project restructuring should a disaster strike and allows the Bank to support recovery efforts quickly, if required.

Compliance Procedures

Financial Management

The DASP will have the overall responsibility to maintain adequate Financial Management (FM) systems agreed in the project legal agreements. These include (a) adequate budget provision and effective utilization; (b) sufficient and timely flow of funds for project activities; (c) maintenance of adequate and competent FM staff all levels; (d) timely payment for project activities and accounting of expenses; (e) oversight on project funds spent under the project; (f) control over assets created under the project; (g) submission of Interim Financial Reports (IFR) and obtaining disbursements from the Bank; and (h) timely submission of audit reports to the Bank. DASP will periodically review the FM arrangements, and any changes required for smooth functioning of the project will be made to PIP in consultation with the Bank and approval of PEC.

Planning and Budgeting

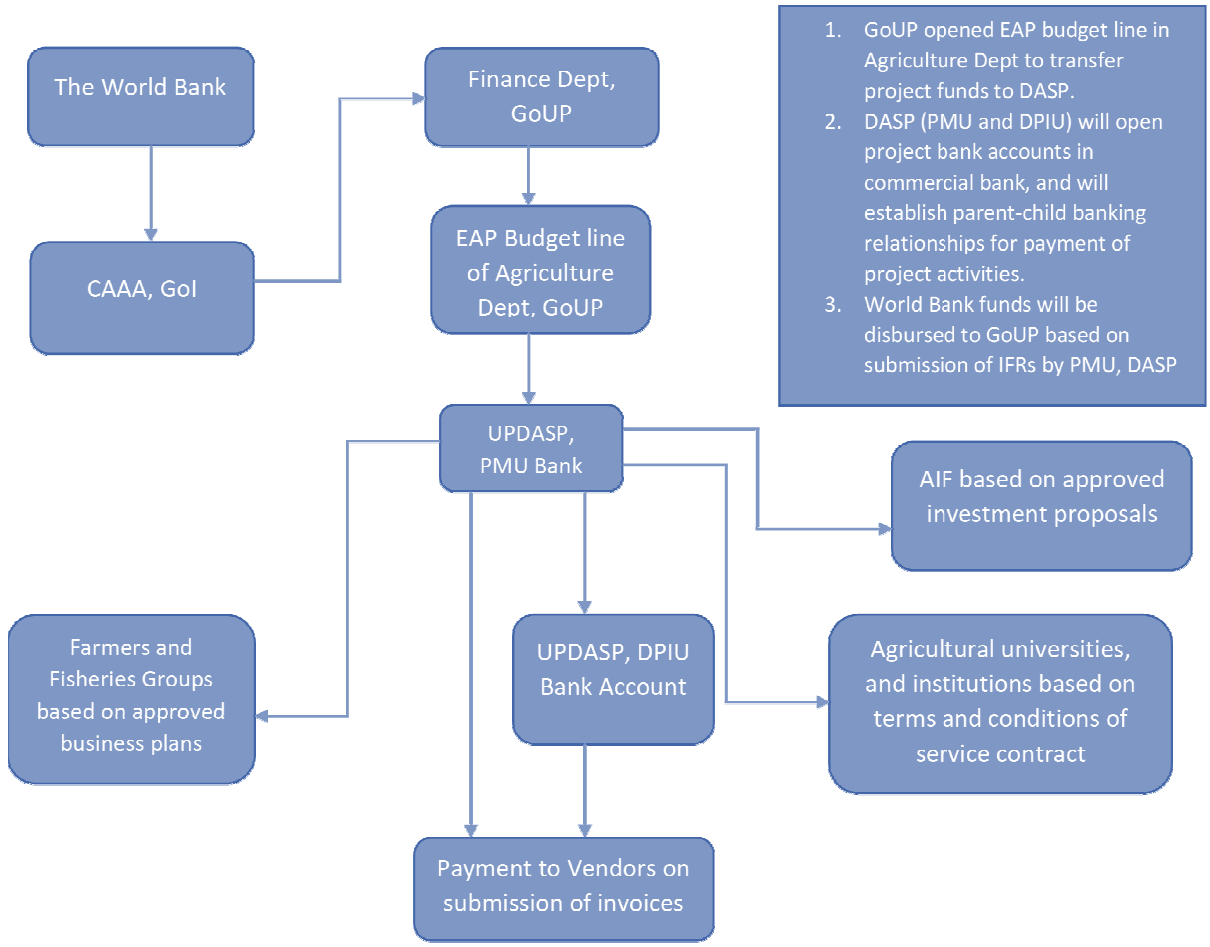
A separate budget line for Externally Aided Project (EAP) has been opened by GoUP and budget provision of INR 200 crores has been provided for FY24-25 (April 24 to March 25) by Finance Department (FD) in Grant no 11 of Agriculture Department. The project funds for future FYs will be annually budgeted by FD in the EAP budget line based on Annual Work Plans (AWP) and Budget Estimates (BE) prepared by PMU and endorsed by PEC. This project budget will be approved by State Legislature (as part of annual State budget) in February - before beginning of each FY. The budget utilization during the FY will be closely monitored by DSAP and Coordination Dept, and any additional demand for project funds during the year will be requested from the Finance Department in RE budget cycle of September / October.

Flow of Funds

DASP will open project bank accounts for PMU and zero balance bank accounts for DPIU in commercial bank. On approval of project budget by GoUP, DASP will obtain sanction order from the Coordination department and funds will be drawn from EAP budget line into PMU bank account. Parent-child banking relationships will be established between PMU and DPIU for efficient fund management. This arrangement will ensure that no idle floats / funds are

available at DPIU. The PMU will allocate funds to DPIU based on approved Annual Work Plans, physical & financial progress. All payments to vendors, suppliers and Grant beneficiaries will be electronically done by PMU and DPIU from these bank accounts. The payments will be made in accordance with 'Delegation of Financial Powers' approved by PEC.

Figure 39: UP-AGREES Flow of Funds



Accounting and Internal Control

The Project accounting will be supervised by Finance section of DASP. It is headed by Finance Manager (deputed from State Financial Services) with experience in handling government accounting and FM matters. At PMU, FM consulting firm will be engaged to provide support to DASP on accounting matters. At DPIUs, individual accountants will be appointed. The staff will be trained on World Bank disbursement policies and use of Client Connection portal. Key principles of accounting and bookkeeping for the project will be as follows:

- The project accounts will be maintained in an off the shelf accounting software. The software will be procured within one month from project effectiveness. PMU and DPIUs will be the Accounting Centres responsible to maintain project accounts.

- Project chart of accounts (CoA) will be developed keeping in view the needs of the accounting software and project reporting requirements. The CoA will facilitate reporting by project Component, Sub-Component, Activities and Disbursement Category as per final agreed project cost tables.
- Accounts will be maintained in double entry system of accounting and will follow cash basis of accounting, i.e., a transaction will be accounted at the time of receipt of funds and making payments.
- Following registers will be maintained for the project: Cash Book, General Ledger, Cheque Issue Register, Advance Register, Register of Receipts, Deduction and Deposit Register for EMD; Security Deposit; Income Tax and other Deductions, Fixed Asset Register, Beneficiary Contributions Register (formats will be included in the FM manual).
- The Bank account at PMU and DPIU will be operated by joint signatories. Payments exceeding Rs. 5,000/- shall be made only through RTGS/NEFT system.
- Payments will be supported by proper bills / invoices.
- Payments made on Works, Goods, Services and operational costs will be recorded in the books as expenditure. However, any advances paid to project staff, suppliers / contractors for works, procurement of goods and services shall be treated as advances in project books and will be adjusted on receipt of documents (i.e. actual receipt of goods or services / utilization certificates).
- Assets acquired under the project will be recorded in project books at cost value that include all direct costs (i.e., purchase price, transportation expenses, installation charges and other expenses incurred for bringing the asset in working condition). Any assets constructed under the project will be valued at direct cost incurred towards constructing the asset, and will be accounted in the books as asset after it is fully operational.
- The project accounts will be consolidated by PMU at the end of every month. DPIU will submit 'monthly accounts' to PMU.
- The Bank reconciliation will be monthly done by PMU and DPIU. The Bank Reconciliation Statement (BRS) will form a part of the 'monthly reports' to be submitted by DPIU to PMU.
- Reconciliation of Fund Received by DPIU (in child account) with Fund Transferred by PMU (Parent Account) will be done at the end of every month.
- FM manual for the project will be prepared by PMU in consultation with the Bank that will detail out the accounting procedures and reporting formats to guide the staff on project accounting and internal control principles. The FM manual will be approved by PEC.

Grants and Financial Assistance to Beneficiaries, such as Farmer groups (FPGs, FPOs, FPCs) and Fisheries groups

It will be provided based on approved business plans and meeting grant conditions. Funds will be disbursed by PMU into their bank accounts. The Support Organization hired at DPIUs will have accountants that will provide required support to these Groups on accounts maintenance. The community groups will also be provided with training in accounting and bookkeeping areas. Startup grants given to FPG (under component 1.1) for crop residue management and laser land leveling will be recognized as expenditure in project books at the time of disbursement and amounts will be reported in the IFR and claimed from the Bank. Financial assistance provided [to FPOs for purchase of farm machinery to CHC (sub-component 1.1), purchase of assets and creation of infrastructure (sub-component 1.3), working capital support to seed producing FPOs (sub-component 1.2), and Grants to registered entities (MSMEs, individual enterprises, or Farmer & Fisheries collective) for construction of facilities (sub-component 2.1 and 2.2) will be treated as advance in the project books and the amounts will be claimed from the Bank in IFR on receipt of UC from FPO. The performance of FPO and utilization of Grants will be monitored by PMU with the support of DPIUs. The FPOs are legal bodies formed under Companies Act and Cooperative Societies Act and will provide audit reports to PMU for the Grants utilized. Any Grant that remains unutilized at the close of the project will be refunded PMU, and it will be adjusted from the final IFR. A summary of the Grant fiduciary procedures is provided in Annexure 4.

Partnerships with leading agricultural universities, national and global institutions (including CGIAR)

PMU will sign service contracts / consultancy agreements with the Institutions, and funds will be disbursed to them based on payment milestones mentioned in the contract. The project will recognize expenditure in the books at the time of release of funds to Institutions and it will be eligible for disbursement from the World Bank

Challenge Fund

The proposals will be invited from institutions (agri, allied and agri finance market players) which will be evaluated by PMU according to established selection criteria. Agreements will be signed, and funds will be disbursed to these Institutions based on payment milestones stated in the agreement. The project will recognize expenditure in the books at the time of release of funds to Institutions and it will be eligible for disbursement from the World Bank

Alternate Investment Fund (AIF) for Agribusiness MSEs (equity / debt / hybrid)

The expenditure will be recognized and eligible for disbursement from the Bank at the time of capitalization of fund to AIF by the project. The capitalization will be done in tranches based on annual budget and investment plans (pipeline) estimates prepared by fund

manager. The operational processes, governance, and management of funds and returns will be documented in the AIF manual, based on the guidelines agreed with the government. The fund will submit periodic reports and annual audit reports on actual utilization of funds to PMU. Any funds for capitalization, that do not get invested at the close of the project will be refunded to PMU, and it will be adjusted from the final IFR.

World Bank Disbursement and Financial Reporting

The disbursement method for the Project will be **'Reimbursement'**. The PMU will submit Interim Financial Report (IFR) to the World Bank through Controller of Aid, Accounts and Audit (CAAA), Government of India (GoI). The funds will be disbursed by the Bank to GoI into the Special Account for IBRD Loan maintained by Controller of Aid, Accounts and Audit (CAAA) in Reserve Bank of India (RBI). These amounts will be released by CAAA to the Finance Department of GoUP as per financing norms agreed between GoI and GoUP.

The financial reporting framework for the project will consist of an IFR. The format of the IFR agreed with PMU is attached to PIP and Disbursement and Financial Information Letter (DFIL) of the World Bank. Please see Annexure 5 for more details. The IFR will be submitted by PMU to the Bank within 45 days from the end of each calendar quarter. The IFR will provide information on the sources and application of funds as per disbursement categories and project components. A contract management statement will be annexed to the IFR that will provide details of payments made under each contract signed under the Project.

The IFR will be prepared by PMU from the accounting reports that are generated from the accounting software. To maintain sufficient cash flow requirement for the Project, the PMU will be allowed to submit out-of-turn IFRs to the Bank, as and when substantial expenditures are incurred under the project.

Internal Audit

Audit firm will be engaged by DASP to conduct Internal Audit for the funds spent by PMU and DPIU under the Project. The terms of reference (ToR) on auditor's appointment and detailed audit checklists will be prepared by PMU in consultation with the Bank. The audit firm will be selected following the World Bank procurement regulations. The audits will be conducted atleast semi-annually. The scope of the assignment will be comprehensive and will cover all project FM and Procurement transactions towards funds spent on Goods, works, non-consulting services, consultants' services, Training and Incremental Operating Costs. The audit should be carried out in accordance with the Standards on Internal Audit prescribed by the Institute of Chartered Accountants of India and will include such tests and controls, as the auditors consider necessary for performance of the audit. The firm will also carry a review of selected community groups, including physical verification of a sample of community assets. The internal audit reports along with the corrective actions taken by PMU will be shared with the Bank. The Key objectives of Internal audit would be the following:

- Evaluate adequacy and effectiveness of procurement, financial management and internal control system of the project.
- Ensure compliance to laid down guidelines and procedures.
- Expresses an independent professional opinion on the project operations.
- Identify weaknesses in the procurement, internal control systems and suggest improvements.
- Provide timely information and recommendation to the Management.

External / Financial Audit

PMU will prepare Project Financial Statements (PFS) within 4 months from end of each FY, and these will be audited by firm of Chartered Accountants appointed by DASP, as per Terms of Reference agreed with the Bank. The audit will be carried out in accordance with the Standards of Auditing promulgated by the Institute of Chartered Accountants of India (ICAI). The project audit report will be submitted to the Bank within nine months from end of each financial year (i.e., December 31). The audit report will consist of; (a) audit opinion; (b) project financial statements along with detailed schedules; and (c) management letter. The annual audit report issued by the project auditor along with project financial statements will be placed by PMU before the PEC for approval and disclosed at the website of DASP. The following audit report will be monitored under the project:

Table 81: UP-AGREES Audit Report Details

Responsible Agency	Audit Report	Auditor	Due Date
PMU, DASP, GoUP	Audit Report and Project Financial Statements covering one Financial Year	Firm of Chartered Accountants engaged by DASP as per ToR approved by the Bank	Nine months from end of each FY i.e. December 31

1. The objective of **external audit** is to enable the auditor to express a professional opinion on the following:

- PFS give a true and fair view of the financial position of the Project at the end of the period under audit and of the sources and applications of project funds for that period;
- the Project is in compliance with the financial covenants of the Loan Agreement;
- the Project funds were utilized for the purposes for which they were provided;
- Expenditures, including assets created under the Project, shown in the PFS are eligible for financing under the relevant Loan Agreement and these were exclusively financed through the Project funds and no other sources of funds have been received by DASP for incurring these expenditures;

- IFRs submitted by the PMU can be relied upon to support applications for withdrawal of the Loan, and adequate supporting documentation has been maintained to support these claims;
- Project has an adequate internal control system and adheres to the provisions of the PIP and FM Manual in all material aspects.

2. **Audit Committee**: DASP will form an Audit Committee to review the audit observations provided by Project Internal and External auditors. The responses to audit observations / audit compliances will be promptly attended by concerned PMU and DPIU staff. The Audit Committee will meet at least once in every six months to review the audit observations and audit compliances. The nodal officers of PMU and DPIUs will attend these Audit Committee meeting. The corrective actions taken by project will be shared with the Bank.

Procurement

The Uttar Pradesh Diversified Agriculture Support Project (UP-DASP) Project Management Unit (PMU) is an autonomous society established to promote sustainable agricultural growth, employment generation, and poverty alleviation through agricultural diversification in the state. Under the UP-AGREES Project, all procurable items and activities, including goods, works, non-consultancy services, consultancy services, and operating expenses such as trainings and workshops, shall be procured in accordance with the World Bank Procurement Regulations. Procurement under the project will strictly adhere to the provisions outlined in the World Bank Procurement Regulations for IPF Borrowers Fifth Edition September 2023 (Procurement Regulations), which are mandatory for the procurement of Goods, Works, Non-Consulting Services (NCS), and Consulting Services (CS) under Investment Project Financing (IPF).

Procurement Plan

UPDASP will develop a procurement plan for first eighteen months by project and this will be agreed with the World Bank prior to negotiations. This plan will serve as the foundation for procurement throughout its active period. The Procurement Plan will be updated every 12 months or earlier, as needed. Items to be procured under the Project shall adhere to the Procurement Plan agreed upon with the World Bank. In accordance with paragraph 5.9 of the "World Bank Procurement Regulations for IPF Borrowers" Fifth Edition, September 2023 ("Procurement Regulations") the Bank's Systematic Tracking and Exchanges in Procurement (STEP) system will be utilized to prepare, clear, and update Procurement Plans, as well as to conduct all procurement transactions for the Project. As far as thresholds for procurement and procurement methods are concerned, the provisions as laid down in this Procurement Plan, including its amendments as agreed with the World Bank, shall prevail.

Procurement Cell

The PMU will oversee all procurements related to the Project. UPDASP will be responsible for ensuring compliance with the Bank's Procurement Regulations, and reporting to the Bank in a timely manner. The PMU, UP-AGREES Project will have dedicated procurement staff conversant with Bank's Procurement Regulations and experience of working in Bank-funded Projects. The PMU will create an internal Procurement Cell for coordinating the procurement and contract management aspects.

Record Keeping

All records related to the contract award, such as bid notifications, registers concerning the sale and receipt of bidding documents, minutes of bid openings, Bid Evaluation Reports, and all correspondence related to bid evaluation and communication exchanged with the World Bank, along with bid securities and approvals of bid invitations/evaluations by the PMU, will be retained.

Methods of Procurement & Related Thresholds and Prior Review Thresholds

The following conditions apply to all procurement activities in the Procurement Plan. The other elements of the Procurement Plan as required under paragraph 4.4 of the Procurement Regulations are set forth in STEP.

Selection methods: Procurement Plan will list review requirements for each of the packages. Prior review and procurement method thresholds agreed with the World Bank for the Project based on the risk assessed are detailed below. These thresholds shall be reviewed and revised, if necessary, during the life of the proposed Project so that these are consistent with the risk assessments made periodically. Any amendments to post-review contracts, raising the contract value to prior review threshold, will also be subject to prior review by the World Bank.

Table 82: Project Procurement Thresholds (Substantial Risk)

Type of Procurement	Method threshold (Million US$)	Prior Review Thresholds (million US$)
Works	International Open Procurement > / = 40 National Open Procurement <40 National Request for Quotation <0.1	10
Goods, IT and Non-Consulting Services	International Open Procurement > / = 3 National Open Procurement <3 National Request for Quotation <0.1	2.0
Consultant Firms	CQS <0.3 LCS, FBS – in justified cases QCBS, QBS - in all other packages Shortlist of National Consultants <2.0 Use of Direct RFP <2.0	1.0
Consultant Individual	As per section 7.34 – 7.39 of Regulations	0.3
Direct Selection	With prior agreement based on justification	0.1
Framework Agreement	For Goods/Works/Non-Consulting Services: As per paragraphs 6.57-6.59 of Regulations. For Consultants: As per paragraph 7.33 of Regulations.	All, irrespective of Value

In addition to the provisions above, and irrespective of the contract value, the following procurement activities are subject to the Bank's procurement prior review:

(a) procurement processes involving contract negotiations, as described in Section VI, paragraphs 6.34-36, of the Procurement Regulations;

(b) Competitive Dialogue, as described in Section VI, paragraphs 6.39-6.41 of the Procurement Regulations;

(c) selection of UN Agencies, as described in Section VI, paragraphs 6.47-6.48 and Section VII, paragraphs 7.27-7.28 of the Procurement Regulations;

(d) selection of probity assurance providers, as described in Section III, paragraph 3.3 of

the Procurement Regulations;

(e) best and final offer, as described in Section VI, paragraphs 6.32-6.33 of the Procurement Regulations; and

(f) any Works contracts under projects determined to be high-risk for SEA/SH that apply SPDs.

The Bank's Standard Procurement Documents (SPDs)

SPDs shall be used for all contracts subject to international competitive procurement and those contracts as specified in the Procurement Plan tables in STEP.

Procurement related Complaints shall be immediately entered in the STEP system and resolved in accordance with provision specified under Annex-III of Procurement Regulations.

National Procurement Arrangements

The National Procurement Procedures (NPP) conditions for India for the procurement of goods, works and non-consulting services according to the established thresholds will be conducted in accordance with paragraphs 5.3 – 5.5 of Section V of the Regulations and the following provisions:

a) Only the model bidding documents for National Competitive Procurement (NCP) agreed with the GOI Task Force (and as amended for time to time), shall be used for bidding.

b) Invitations to bid shall be advertised on a widely used website or electronic portal with free open access at least 30 days prior to the deadline for the submission of bids, unless otherwise agreed in the approved procurement plan.

c) No special preference will be accorded to any bidder either for price or for other terms and conditions when competing with foreign bidders, state-owned enterprises, small-scale enterprises, or enterprises from any given State.

d) Except with the prior concurrence of the Bank, there shall be no negotiation of price with the bidders, even with the lowest evaluated bidder.

e) Government e-Marketplace (GeM) set-up by Ministry of Commerce, Government of India will be acceptable for procurement under Request for Quotations (RFQ) method.

f) At the Borrower's request, the Bank may agree to the Borrower's use, in whole or in part, of its electronic procurement system, provided that the Bank is satisfied with the adequacy of such system.

g) Procurement will be open to eligible firms from any country. This eligibility shall be as defined under Section III of the Procurement Regulations. Accordingly, no bidder or potential bidder shall be declared ineligible for contracts financed by the Bank for reasons other than those provided in Section III of the Procurement Regulations.

h) The request for bids/request for proposals document shall require that Bidders/Proposers submitting Bids/Proposals include a signed acceptance in the bid, to be incorporated in any resulting contracts, confirming application of, and compliance with, the Bank's Anti-Corruption Guidelines, including without limitation the Bank's right to sanction and the Bank's inspection and audit rights.

i) The Borrower shall use an effective complaints mechanism for handling procurement related complaints in a timely manner.

j) Procurement Documents will include provisions, as agreed with the Bank, intended to adequately mitigate against environmental, social (including sexual exploitation and abuse and gender-based violence), health and safety ("ESHS") risks and impacts

Domestic Preference: The provisions of domestic preference will be applied in the evaluation of bids in accordance Section VI of the Regulations.

E-Procurement

The UPDASP is already using the National Informatics Center (NIC) e-procurement system. An assessment of the NIC e-procurement system has been done by the World Bank and it has been found suitable for use in Bank funded projects, in accordance with Multilateral Development Banks (MDB) egovernance projects requirements. Therefore, the same system shall be used for procurements under this Project.

Approved Selection Methods: The Bank defines, in accordance with paragraphs 6.1 and 6.2 of Section VI of the Regulations, the following provisions as approved selection methods for Goods, Works, and Non-consulting Services:

a. Request for Proposals (paragraphs 6.3 and 6.4 of Section VI of the Regulations)**:** A RFP is a competitive method for the solicitation of Proposals. It should be used when, because of the nature and complexity of the Goods, Works, or Non-consulting Services to be procured, the Borrower's business needs are better met by allowing Proposers to offer customized solutions or Proposals that may vary in the manner in which they meet or exceed the requirement of the request for proposals document.

An RFP is normally conducted in a multi-stage process. To allow an evaluation of the degree to which Proposals meet the requirements of the request for proposals document the evaluation normally includes rated type criteria and an evaluation methodology.

b. Request for Bids (paragraphs 6.5 and 6.6 of Section VI of the Regulations)**:** A RFB is a competitive method for the solicitation of Bids. It should be used when, because of the nature of the Goods, Works, or Non-consulting Services to be provided, the Borrower is able to specify detailed requirements to which Bidders respond in offering Bids.

Procurement under this method is conducted in a single-stage process. Qualifying criteria (minimum requirements normally evaluated on a pass/fail basis) are normally used with RFB. Rated-type evaluation criteria are normally not used with RFB.

c. Request for Quotations (paragraphs 6.7 of Section VI of the Regulations): A RFQ is a competitive method that is based on comparing price quotations from firms. This method may be more efficient than the more complex methods for procuring limited quantities of readily available off-the-shelf Goods or Non-consulting Services, standard specification commodities, or simple civil Works of small value. For details see Annex XII, Selection Methods.

d. Direct Selection (paragraphs 6.8, 6.9 and 6.10 of Section VI of the Regulations)**:** Proportional, fit-for-purpose, and VfM considerations may require a direct selection approach: that is, approaching and negotiating with only one firm. This selection method may be appropriate when there is only one suitable firm or there is justification to use a preferred firm.

Direct selection may be appropriate under the following circumstances:

a. an existing contract, including a contract not originally financed by the Bank, for Goods, Works, or Non-consulting Services, awarded in accordance with procedures acceptable to the Bank, may be extended for additional Goods, Works, or Non-consulting Services of a similar nature, if:

- it is properly justified;
- no advantage could be obtained through competition; and
- the prices on the extended contract are reasonable;

b. there is a justifiable requirement to re-engage a firm that has previously completed a contract, within the last 12 months, with the Borrower to perform a similar type of contract. The justification shall show that:

a) The firm performed satisfactorily in the previous contract;
b) No advantage may be obtained by competition; and
c) The prices for the direct contracting are reasonable;
d) c. The procurement is of both very low value and low risk, as agreed in the Procurement Plan;
e) d. The case is exceptional, for example, in response to Emergency Situations;
f) e. Standardization of Goods that need to be compatible with existing Goods may justify additional purchases from the original firm, if the advantages and disadvantages of another brand or source of equipment have been considered on grounds acceptable to the Bank;
g) f. The required equipment is proprietary and obtainable from only one source;

h) g. The procurement of certain Goods from a particular firm is essential to achieve the required performance or functional guarantee of an equipment, Plant, or facility;

i) h. The Goods, Works, or Non-consulting Services provided in the Borrower's country by an SOE, university, research center or institution of the Borrower's country are of a unique and exceptional nature in accordance with Paragraph 3.23 c.; or

j) Direct selection of UN Agencies in accordance with Paragraphs 6.47 and 6.48. 6.10 In all instances of direct selection, the Borrower shall ensure that:

k) the prices are reasonable and consistent with the market rates for items of a similar nature; and

l) The required Goods, Works, or Non-consulting Services are not split into smaller-sized procurement to avoid competitive processes.

Approved Selection Methods for Consultant

The Bank defines, in accordance with paragraphs 7.1 and7.2 of Section VII of the Regulations, the following provisions as approved selection methods particular types of approved selection arrangements, and market approach options available for the selection of Consulting Services in IPF operations.

a) Quality Cost Based Selection (QCBS);

b) b. Fixed Budget Based Selection (FBS);

c) c. Least Cost Based Selection (LCS);

d) d. Quality Based Selection (QBS);

e) e. Consultant's Qualifications Based Selection (CQS); and,

f) f. Direct Selection.

Quality and Cost-based Selection (paragraph 7.3 of VII of the Regulations)

QCBS is a competitive process among Shortlisted consulting firms under which the selection of the successful firm takes into account the quality of the Proposal and the cost of the services. The request for proposals document shall specify the minimum score for the technical Proposals. The relative weight to be given to the quality and cost depends on the nature of the assignment. Among the Proposals that are responsive to the requirements of the request for proposals document and are technically qualified, the Proposal with the highest combined (quality and cost) score is considered the Most Advantageous Proposal.

Fixed Budget-based Selection (paragraph 7.4 & 7.5 of section of the Regulations)

Like QCBS, FBS is a competitive process among Shortlisted consulting firms under which the selection of the successful firm takes into account the quality of the Proposal and the cost of the services. In the request for proposals document, the cost of services is specified as a fixed budget that shall not be exceeded. FBS is appropriate when: a. the type of

Consulting Service required is simple and can be precisely defined; b. the budget is reasonably estimated and set; and c. the budget is sufficient for the firm to perform the assignment.

The request for proposals document specifies the budget and the minimum score for the technical Proposals. The Proposal with the highest technical score that meets the fixed budget requirement is considered the Most Advantageous Proposal

Least Cost-based Selection (paragraph 7.6 &7.7 of section VII of the Regulations)

Similar to QCBS, LCS is a competitive process among Shortlisted consulting firms under which the selection of the successful firm takes into account the quality of the Proposal and the cost of the services. LCS is generally appropriate for assignments of a standard or routine nature (such as engineering designs of non-complex Works), for which well-established practices and standards exist.

The request for proposals document specifies the minimum score for the technical Proposals. Among the Proposals that score higher than the minimum technical score, the Proposal with the lowest evaluated cost is considered the Most Advantageous Proposal.

Quality-based Selection (paragraph 7.8 &7.9 of VII section of the Regulations) **:**

Under QBS, the Proposal quality is evaluated without using cost as an evaluation criterion. If the request for proposals requests both technical and financial Proposals, the financial Proposal of only the highest technically qualified firm is opened and evaluated to determine the Most Advantageous Proposal. However, if the request for proposals document requests only technical Proposals, the firm with the highest-ranked technical Proposal is invited to submit its financial Proposals for negotiations.

QBS is appropriate for the following types of assignments: a. complex or highly specialized assignments for which it is difficult to define precise TOR and the input required from the firm, and for which the Borrower expects the firm to demonstrate innovation in its Proposals; b. assignments that have a high downstream impact; and c. assignments that can be carried out in substantially different ways, so that Proposals will not be comparable.

Consultant's Qualification-based Selection (paragraph 7.11 &7.12 of section VII of the Regulations):

The Borrower shall request expressions of interest (REOI), by attaching the TOR to the REOI. At least three qualified firms shall be requested to provide information about their relevant experience and qualifications. From the firms that have submitted an EoI, the Borrower selects the firm with the best qualifications and relevant experience and invites it to submit its technical and financial Proposals for negotiations. Advertisement of REoIs is not mandatory.

CQS is appropriate for small assignments or Emergency Situations in which preparing and evaluating competitive Proposals is not justified.

Direct Selection (paragraph 7.13 ,7.14 &7.15 of section VII of the Regulations):

Proportional, fit-for-purpose, and VfM considerations may require a direct selection (single-source or sole-source selection), approach, that is: approaching and negotiating with only one firm. This selection method may be appropriate when only one firm is qualified, a firm has experience of exceptional worth for the assignment, or there is justification to use a preferred firm.

Direct selection may be appropriate under the following circumstances:

a) an existing contract for Consulting Services, including a contract not originally financed by the Bank but awarded in accordance with procedures acceptable to the Bank, may be extended for additional Consulting Services of a similar nature, if it is properly justified, no advantage may be obtained by competition, and the prices are reasonable;
b) for tasks that represent a natural continuation of previous work carried out by a Consultant within the last 12 months, where continuity in the technical approach, experience acquired, and continued professional liability of the same Consultant may make continuation with the initial Consultant preferable to a new competition, if performance has been satisfactory in the previous assignment(s);
c) there is a justifiable requirement to reengage a firm that has previously completed a contract with the Borrower to perform a similar type of Consulting Service. The justification shows that the firm performed satisfactorily under the previous contract, no advantage may be obtained by competition, and the prices are reasonable;
d) the procurement is of both very low value and low risk, as agreed in the Procurement Plan;
e) in exceptional cases, for example, in response to Emergency Situations;
f) only one firm is qualified, or one firm has experience of exceptional worth for the assignment;
g) the Consulting Services provided in the Borrower's country by an SOE, university, research center, or institution of the Borrower's country are of a unique and exceptional nature, in accordance with Paragraph 3.23 c.; or
h) direct selection of UN Agencies in accordance with Paragraphs 7.27 and 7.28.
i) In all instances of direct selection, the Borrower shall ensure fairness and equity, and shall have in place procedures to ensure that:

    - the prices are reasonable and consistent with the market rates for services of a similar nature; and
    - the required Consulting Services are not split into smaller-size procurements to avoid competitive processes.

Environment and Social Safeguards

Based on the findings of the detailed environment and social assessment (ESA) carried out by the project during the planning and design phase, the overall project design is environmentally sound and socially acceptable to the communities in the districts where it will be implemented.

The UP-AGREES project has following three major Components, each of which have various subcomponents.

- Component 1: Productivity Enhancement
- Component 2: Commodity Clusters
- Component 3: Strengthening Ecosystems and Promoting Innovations

The framework for managing the project's environment and social risk and impacts (the ESMF – provide URL when disclosed) reflects a systematic and organized approach to ensure compliance and accountability during the entire project cycle. The social and environmental risks and impacts identified during the ESA will be monitored on continuous basis throughout the project implementation cycle. Monitoring social and environmental risks and safeguards on a continuous basis is a crucial aspect of responsible project management. This practice will help in ensuring that potential issues will be proactively identified before implementation of sub-projects and risk informed mitigation measures will be implemented as required.

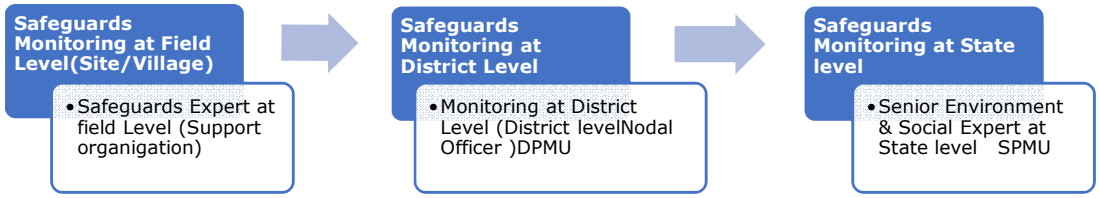
The key processes that will be followed for E&S risk and impact management of the UP-AGREES Project is further elaborated in the following sections.

Institutional responsibility for environmental and social (E&S) management

The overall project management structure comprises a State Project Management Unit (SPMU; at the state level), District Project Management Units (DPMUs; at the district level) and Support Organizations (SOs; at the sub-district level). The SPMU will have adequate environmental and social staff for overall planning and implementation of environmental and social management of the project. For identification, management and mitigation of E&S risks and impacts at the field level, each SO will be required to have one Social Safeguards and one Environment Safeguards Expert in its team. Each SO's E&S staff will report to the respective District Project Management Units (DPMUs) for review and management of various sub-project specific safeguards issues. Each DPMU will have one designated nodal staff to oversee E&S safeguards management of sub-projects being implemented in the concerned district. After review, revision (if required) and clearance of outputs submitted by the SOs' E&S specialists, the nodal officer from the DPMU will compile various district level E&S outputs and send the same to to the E&S specialists at the SPMU on a monthly / quarterly / half-yearly / annual basis (frequency of submission of different types of sub-project specific E&S reports will be determined post project effectiveness). The compilation

and summarization of these 28 districts' reports will then be done by SPMU and the same will be shared with the World Bank through monthly / quarterly / annual progress and / or status reports. Basis outputs submitted by the DPMUs and regular field visits, the SPMU will, in consultation with the concerned DPMUs and SOs, identify sub-projects that have serious E&S risks and / or adverse E&S impacts and provide hands on management support. In addition to the above arrangements, the project has a provision for independent monitoring of various sub-projects through an external agency. The external monitoring agency's terms of reference would include, on a sample basis, monitoring of and reporting on the project's compliance with various environment and social standards (ESS) triggered for the project. Safeguards monitoring arrangement is given in Figure below.

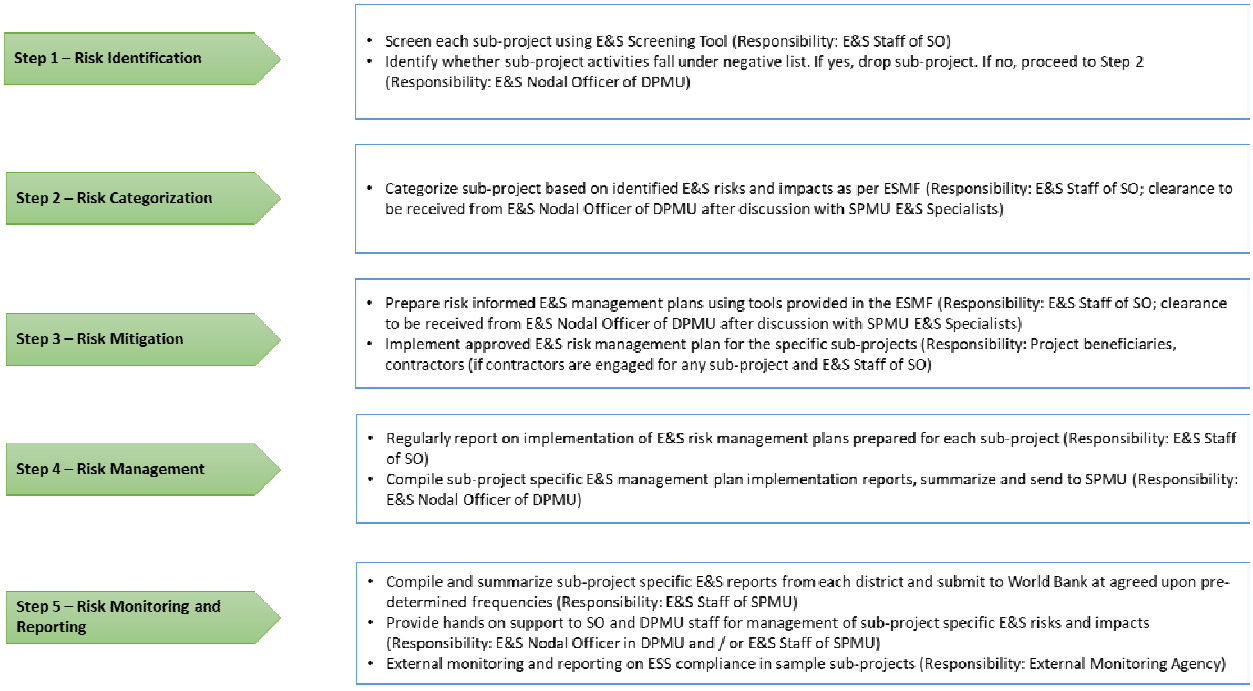
Figure 40: Safeguards Monitoring Arrangement



Environmental and Social screening

An environmental & social checklist (ESS Tool) will be used to identify potential E&S risks and impacts of various sub-projects, categorise the sub-projects based on the identified risks and impacts and follow the project's risk management hierarchy (avoid-minimise-mitigate-offset or compensate) as outlined in the project ESMF. The various steps involved in the E&S risk management of sub-projects under UP-AGREES is outlined in the figure below:

Figure 41: Steps Involved in the E&S Risk Management of Sub-Projects



Potential investments to be excluded (Negative list) from UP-AGREES

A list of investments that will be excluded from the scope of UP-AGREES is given below.

- Use of pesticides banned by GOI
- Use of uncertified seeds
- Use of Hazardous Pesticides and Chemicals
- Burning of crop residue
- Markets (Fish) without proper drainage & ETP facility
- Diversion of Forest Land to the purpose of the project is completely prohibited
- Deforestation
- Tobacco processing machinery
- Child Labour
- Tank filling (Fish Pond) through groundwater in Dark Zone
- Major loss of common property resources affecting the livelihood systems of local people
- Violation of Indigenous Rights: Prohibition of activities that infringe upon the rights of indigenous communities to control their traditional lands and resources, including land expropriation, resource extraction, or infrastructure development without their consent.
- Excessive Resource Extraction: Prohibition of unsustainable agricultural practices that lead to soil degradation, erosion, or depletion of natural resources such as groundwater or nutrients, jeopardizing the long-term viability of agricultural production systems.
- Social Discrimination and Inequity: Prohibition of discriminatory practices based on gender, ethnicity, religion, or other factors in access to land, resources, credit, markets, or decision-making processes related to agriculture.
- Exploitation of vulnerable populations: The project will not exploit or marginalize vulnerable populations, including smallholder farmers, women, or migrant workers.
- Discrimination: Discrimination based on race, ethnicity, gender, religion, or any other characteristic should be prohibited in all project activities, including hiring practices and distribution of benefits.

Environmental & Social Safeguards management clauses in construction contracts

Bidding documents of all construction works required under the project (viz. Fish Markets, Ponds, Warehouses, other civil works) will include standard environmental specifications (mitigation measures tool) to mitigate impacts related to occupational health and safety; pollution from wastes; and air, soil, and water pollution.

Environment and Social Safeguards Monitoring Tools

The entire process will be operated and monitored under the Safeguard module of MIS which will be interlinked with all the components of the project. Safeguard monitoring will be done through various tools under the Safeguard modules as shown in the table below. These tools will provide guidance for screening and management of environmental and social issues at the sub-project level and appropriate actions during the planning and implementation phases of project activities. This decentralized structure will ensure that monitoring efforts are closely linked to the local regional and context of specific sites of project activities.

Table 83: Safeguards Monitoring Tools

Tool	When
Environmental and Social Safeguards Screening Tool	During identification and selection of every sub-project
Environmental & Social Issues Mitigation Measures Tool (ESMMT)	During the Implementation of the project activities (This tool will likely outline actions and measures to be taken and avoided to minimize negative environmental and social impacts)
Impact Assessment Tool (IAT)	Comparative assessment (Pre& Post) of safeguards issues.

Capacity Building

The SPMU will conduct regular orientation training (at least once every six months through the duration of the project) on E&S issues related to the project for E&S staff of SOs, the E&S Nodal officers at DPMUs, contractors, project beneficiaries and other stakeholders (block level officials, line department officials, etc.). In addition, specialised training and capacity building programs for project staff on specific E&S issues related to the project, cross learning visits to other states / countries, participation in state / national / international seminars and workshops on management of emerging E&S issues in the agriculture sector will be supported by the project.

Annexure 1: Challenges and Opportunities in the Digital Agriculture Sector

Policy and Regulatory Environment

The government of Uttar Pradesh, while guided by the Digital India Mission, currently lacks a specific IT policy for governance transformation. This gap, coupled with the absence of a progressive agriculture policy that includes a focus on digital agriculture, hinders effective data sharing among diverse agencies and impacts the development of Digital Public Infrastructure as a shared public asset. The last policy on agriculture in the state was formulated in 2013, and since then, the landscape has significantly evolved, necessitating an updated policy that aligns with current trends and technologies. The state does have an IT and ITES policy 2022 to encourage investment in the domain and a separate Data Centre Policy, but these do not specifically address the needs for digital transformation in the agriculture sector. Furthermore, the state's cyber security policy, crucial for the protection of digital assets and data, is still in the draft stage and awaiting cabinet approval as of May 2023.

Within the Department of Agriculture, there is no clear roadmap to support digital transformation initiatives. The establishment of clear goals, strategies, and performance indicators is essential to measure the implementation and impact of such transformations. The IT unit within the agriculture department, responsible for maintaining the Pardarshi Kisan Seva Portal and other ICT tools, needs fortification with experienced professionals and a clear mandate to undertake comprehensive digital transformation projects. As of May 2023, the Department of Agriculture lacks a concrete Digital Governance strategy. Globally, successful digital transformations in agriculture are underpinned by a comprehensive data management strategy, which includes data governance, data quality management, and data privacy and security measures. Therefore, adopting these practices could significantly enhance the Department of Agriculture's digital transformation aspirations.

Connectivity infrastructure

Uttar Pradesh has a tele density of 65.99%, with a substantial wireless subscriber base of 16.19 crores and a wireline subscriber base of 15.68 lakhs, according to the trai report. This indicates a significant potential for digital connectivity and service delivery in the state. However, the state's implementation of the bharatnet project, aimed at expediting the establishment of broadband infrastructure, leaves room for further acceleration and improvement. In a promising move, the state has notified the state data center policy, which aims to position Uttar Pradesh as a preferred investment destination for the data center industry. The policy's ambitious goals include the development of a 250 mw data center industry in Uttar Pradesh, attracting investment worth rs. 20,000 crores, and establishing at least three state-of-the-art private data center parks in the state. These

initiatives could significantly enhance the state's digital infrastructure and capacity. However, despite these advancements, digital access remains a challenge for small holder farmers fho often face poor digital literacy and low connectivity in rural areas. This digital divide hinders the optimal usage of online platforms designed to provide agricultural services and market agricultural products. Therefore, while the state is making strides in improving its digital infrastructure, it is crucial to ensure that these benefits reach all sections of society, particularly the farming community, who stand to gain the most from these advancements.

Electronic Public Services Delivery Ecosystem

As per the National e-Governance Service Delivery Assessment (NeSDA) 2021 report of DARPG, Government of India, Uttar Pradesh has shown commendable improvement in online service delivery over past two years. The state ranks second overall, with an overall score of 0.56. This ranking is based on seven parameters: Accessibility, Content Availability, Ease of Use, Information Security and Privacy, End Service Delivery, Integrated Service Delivery, and Status & Request Tracking. In the Environment sector, Uttar Pradesh is the top performer, ranking first with an overall score of 0.90. In the Labour and Employment sector, the state ranks second with an overall score of 0.68. The report also notes that Uttar Pradesh uses the Central Ministry portal to deliver services across seven focus sectors, indicating a collaborative approach to e-governance between the central and state government.However, the Department of Agriculture has yet to reach its full potential in terms of leveraging digital technologies for providing a Whole of Government service experience to the farmer and associated stakeholders in agriculture domain. The agricultural sector in the state is served by a multitude of units and departments, each operating through their own individual portals. The Digital Maturity assessment study of the agriculture ecosystem conducted by the World Bank evaluated several of these portals, shedding light on their individual functionalities and the gaps in their interconnectedness. Figure 1 below provides a list of some of the portals.

These portals, unfortunately, exist in isolation, functioning independently of each other. This fragmented approach to service delivery, characterized by multiple, separate portals, creates a significant barrier for farmers, Farmer Producer Companies (FPCs), and other stakeholders seeking to access government services. The existence of multiple portals means that users must navigate through a multitude of platforms, each with its own unique interface and set of procedures. This can be particularly challenging for users who are less familiar with digital technology, as they must learn to use each portal separately. The process can be time-consuming and confusing, leading to frustration and potentially discouraging users from accessing these services. Moreover, approach is not in line with the principles of digital design as enumerated in India Enterprise Architecture Framework and India Digital Ecosystem for Agriculture approach mandated by government of India, which

emphasize on simplicity, user-friendliness, and seamless user experience. This lack of a 'Whole of Government' approach, where services are integrated and delivered through a single platform, hinders the accessibility and usability of online services and results in lower uptake and usage, preventing the full realization of the benefits of digital service delivery.

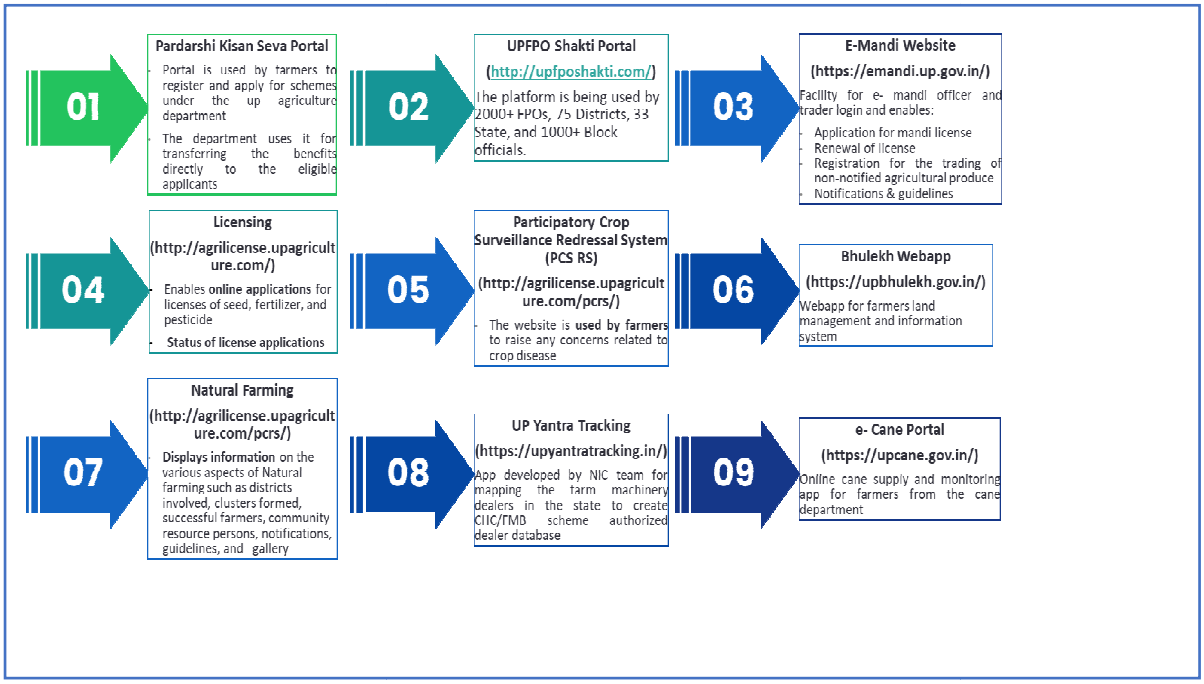


Figure 1: Multitude of Portals run by individual departments providing services to farmers in the state of Uttar Pradesh.

Data Ecosystem

The Department of Agriculture, and the Department of Revenue in Uttar Pradesh, have initiated the digitization of farmers, farm, and crop data under the National Agristack initiative. This includes the establishment of partial base registries, digitization of farm particulars, and regular updating of crop data, which has facilitated the compilation of a substantial database of farmers, farms, and crops. However, this approach has led to data silos, with multiple departments collecting similar data in different formats. This not only results in duplication of efforts but also creates challenges in data substantiation and reporting to the central government. Furthermore, the absence of a single source of truth for each dataset leads to data discrepancies and inconsistency. The current landscape is characterized by few strategic partnerships, heterogeneous datasets, limited cross, and open APIs, localized data-sharing platforms, duplicative databases, and dispersed information across multiple systems.

At the national level, a well-defined policy, the National Data Sharing and Accessibility Policy (NDSAP) exists to guide data sharing and accessibility. However, it has not been adopted by the Department of Agriculture and its allied departments in Uttar Pradesh, limiting the potential for broader utilization and innovation. Drawing from global best practices in data-

based farm and food systems, maintaining a single source of truth is a common practice in successful digital ecosystems to ensure data consistency and accuracy. Many countries have also adopted open data policies in agriculture, promoting transparency, innovation, and collaboration among stakeholders. Furthermore, a comprehensive data management strategy, which includes data governance, data quality management, and data privacy and security measures, underpins successful digital transformations in agriculture globally. Therefore, adopting these practices, including the implementation of NDSAP and the development of a comprehensive data management strategy, could significantly enhance the Department of Agriculture's digital transformation journey.

Collaborative Networks and External Supportive Conditions

The Department of Agriculture and allied departments in Uttar Pradesh currently face significant capacity gaps and a lack of sufficient digital infrastructure. To address these challenges and ensure the success of the proposed digital agriculture ecosystem under the UP-AGREES project, it is crucial to engage a broad network of external actors. This network should include agricultural and engineering institutes, technology companies, research institutes, non-governmental organizations, and agritech entrepreneurs. These stakeholders can supplement government capacities with their wealth of knowledge, resources, and innovative solutions, playing a crucial role in enriching the digital agriculture environment in Uttar Pradesh. Notably, IIT Kanpur's Center of Excellence in AI can be a significant catalyst for the development of advanced agriculture information systems and AI-based decision support systems.

Uttar Pradesh is home to a multitude of institutions offering programs in digital agriculture or Agritech, such as IIAS BHU and IIM Lucknow, among others. These institutions can

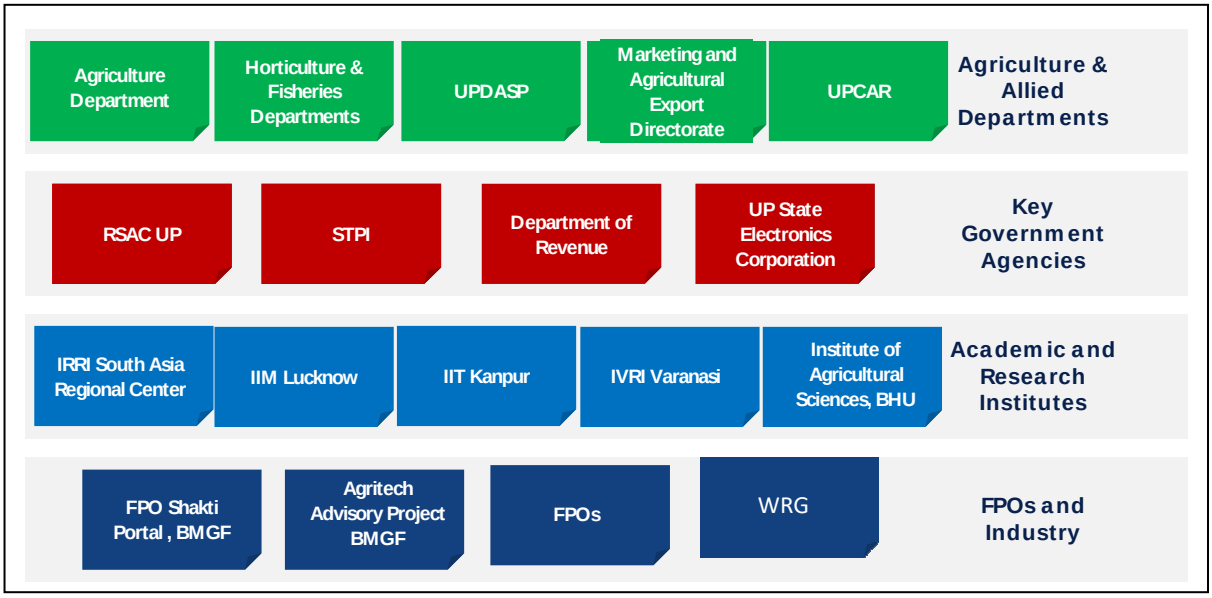


Figure 2: Collaborative Network Ecosystem Actors in Uttar Pradesh

Significantly contribute to the capacity building of department of agriculture in leveraging the potential of advanced agriculture information systems and AI-based decision support systems. Furthermore, the state's innovation landscape is teeming with potential, with various ministries and educational institutions running multitude of innovation hubs and startup accelerator programs. However, the potential of these startups and innovation hubs remains largely untapped in the pursuit of an Agriculture 3.0 revolution in the state. To fully leverage this vibrant ecosystem, it is vital to identify and engage Agritech Entrepreneurs capable of developing cutting-edge applications for the proposed digital agriculture ecosystem and service delivery platform. Numerous private sector entities, both at national and global levels, have been assisting the government in its digital transformation journey. Some of the notable partnerships are evident in programs such as the FPO Shakti Portal, jointly developed by DoA and BMGF, and the "India Agritech Advisory Project," an initiative steered by the International Finance Corporation (IFC), a World Bank Group Agency. These partnerships need to be expanded to not only encompass businesses but also extend to academia and civil society organizations, thus ensuring a comprehensive inclusion of various stakeholders in this digital transformation journey.

However, it's important to note that the reach of civil society and other partners hasn't fully extended to underserved and remote areas in Uttar Pradesh. This limited reach could potentially result in uneven progress and benefits distribution. However, with the forthcoming implementation of the UP-AGREES project, this situation is expected to significantly change. The UP-AGREES project is designed to extend the benefits of digital agriculture to even the remotest corners of the state, ensuring comprehensive and inclusive development. The national banks and investment institutions are supporting the digital agenda at the national and state level. However, efforts to stimulate investments and partnerships in the agriculture sector in UP need to be intensified to ensure this sector gets the attention of Banks and investment institutions.

Annexure 2: Crop Variety Details

List of Kharif crops and their varieties for UP-AGREES districts

Crops	Varieties	Area of Adoption	Year of release	Duration (days)	Yield (q/ha)	Specialty
Groundnut	GJG-31	Gujarat (Summer)	2012	117	34.83	70.62% Shelling, Oil content 49.24%.
	HNG-123	Gujarat, Punjab, UP (Kharif)	2012	124	26.48	67% Shelling, Oil content 49%, Virginia Bunch.
	J 87	Punjab and UP	2021	108	41.65	70% Shelling, Oil content 50%, high yirlding and bold kernel.
	Raj Mungfali -3	Rajasthan, UP and Punjab (Kharif)	2016	125	31.73	69% Shelling, Oil content 49%. Large seeded, tolerant to SPODOPTERA LITURA (Fabricius) leaf minor and thrips.
Sesame	RT-351	Rajasthan, UP, Punjab	2011	80-85	9-10	White Bold seeded, multi-capsule, oil content 50-52%.
	RT-346	Rajsthan, M.P., U.P.	2009	85-90	9-10	White seed, Oil content 52%.
	GT -6	Gujarat	2018	80-85	10.10	White bold seeded, suitable for export. Oil Oil content 49-51%. Resistant to cercospora leaf spot.
	BUAT Til -1	U.P.	2021	82-85	8	White seeded, Oil content 47.5%. resistant to stem rot, cercospora leaf spot and capsule borer.
Urd	Pratap Urd 1	Rajasthan	2013	74-76	10-11	Moderately tolerant to MYMV, leaf crinkle, Antraccnose, bacterial leaf blight. Tolerant to moisture stress
	IPU 13-1	M.P. and U.P.	2020	74-80	9-10	Resistant to Yellow mosaic, Powdery mildew, Leaf spot and Cercospora leaf blight.
	Vallabh Urd 1	U.P., Haryana and Punjab	2015	70-75	10-11	Tolerant to MYMV
Arhar	IPA- 203	U.P., Haryana, Rajasthan	2014	115-120	16-18	Resistannt to sterility mosaic disease, tolerant to Phytohthora blight and Fusarium wilt
	Pant Arhar- 6	NWPZ (U.P., Haryana, Rajasthan, Jharkhand)	2020	135-177	17-20	Moderately resistant to Wilt and SMD diseases.
	IPH 15-03 (Hybrid)	NWPZ (U.P., Haryana, Rajasthan, Jharkhand)	2021	144-163	16	Resistant to Fusarium wilt, SMD and moderately resistant to Phytophthora blight
Rice	Pant Dhan 24	Odisha and Bihar	2015			
	Sambha sub 1					

Crops	Varieties	Area of Adoption	Year of release	Duration (days)	Yield (q/ha)	Specialty
	BPT 5204					
	NDR 2065	U.P.	2009	120-125	50-55	Recovery70.5.7%, long coarse grain, Moderately resistant to Bacterial leaf blight.
	CSR-56	U.P.	2018	120-125	70	Moderately resistance to pest and diseases (leaf blast, neck blast, sheath rot, bacterial leaf blight, brown spot, stem borer, leaf folder and white backed plant hopper).
	Pusa Narendra K.N.- 1	Eastern U.P.	2022	140-145	32.66	Moderately resistant to BLB, Blast and stem borer. Black husk, short cylinder rice, H.R.-69% .
	Pusa CRD KN- 2	Eastern U.P.	2022	140-145	32.66	Moderately resistant to BLB and Blast . Black husk, short cylinder rice, H.R .65%.

List of Rabi crops and their varieties for UP-AGREES districts

Crops	Varieties	Area of Adoption	Year of release	Duration (days)	Yield (q/ha)	Specialty
Wheat	PBW-187 (Karan Vandana)	**U.P. (Eastern)**	**2019**	**120**	48.8	Timely sown, irrigated conditions. Good biscuit spread factor (8.6cm), High Fe content (43.1 ppm), resistance to yellow and brown rust
	DDW 47	U.P. (Bundelkhand)	**2020**	118-121)	74.1	Durum Variety suitable for timely sown restricted irrigated condition. Highly resistance to black and brown rusts. Posses 12.69% protein. yellow pigment (7.57ppm) excellent quality for pasta.
	DBW-332	UP..	2021	156	70-80	Resistant to Yellow and Brown rust. Protein content 12.2%.
	PBW-757	U.P.	2019	104	36.7	Resistant to Yellow and Brown rust. Biofortified (Zinc content 42.3%).
Mustard	DRMRIJ-31 (Giriraj)	Delhi, Haryana, Jammu & Kashmir, Punjab and parts of Rajastha	2013	137-153	22.25-27.50	Bold seeded, High Oil Content (39- 42.6 %)
	Surekha (KMR16-02)	U.P	2021	125-130	25-28	Timely sown for irrigated conditions
	Bayer Mustard-5450	U.P	2016	130-135	28-30	
Gram	GNG-2144	U.P Plane	2016	133	22.8	Deshi medium grain and Wilt tolerant.
	RVG-202					
	IPC-2005-62 (Kabuli)	U.P	2020	120	20-22	Wilt tolerant and high protein content.
	IPC-2006-77	BundelKhand	2019	115-120	20-25	Medium grain size and wilt resistance.
Pea	Dantiwada Field Pea -1	Eastern U.P	2011	120-125	17-20	Powdery mildew resistance.
	IPFD-10-12	Central U.P	2014	106-109	25-30	Powdery mildew resistance.
	IPFD-2014-2	Bundelkhand	2018	105-110	22-23	Moderately resistance to pod borer, aphid, leaf miner and nematode
	IPFD12-2	Bundelkhand	2016	110	22-25	Resistance to powdery mildew and pod borer. Moderately resistance to aphid and leaf miner.
Lentil	IPL321	U.P	2019	123-138	14-18	Resistance to rust and wilt and tolerant to pod borer aphid.
	PL9	Uttarakhand	2016	113-135	13-14	Small seeded, resistant to rust, wilt and ascochyta blight.
	Kota Masoor-3	U.P	2020	105	18-20	Tolerant to pod borer to aphid.

Annexure 3: Rationale for Selecting Groundnut as a Cluster

Background

The total global market for groundnut is estimated at USD 88.13 billion in 2023 and is expected to reach USD 100.2 billion by 2028[34]. China is the largest producer of groundnut in the world, followed by India. In 2022, China's groundnut production amounted to 18.33 million metric tons, while that of India amounted to 10.14 million metric tons[35]. Further, in 2021, China's groundnut yield was 3,810 kg per hectare, while that of India's was 1,863 kg per hectare[36].

In India, Gujarat is the leading groundnut producer and produces 47% of the country's total produce, followed by Rajasthan and Tamil Nadu, which produce 16% and 10% of India's total groundnut. The share of Uttar Pradesh in the country's total groundnut production is 0.9%[37].

As per APEDA, Indian export of groundnut has been witnessing an increasing trend. During FY23, Indian groundnut exports touched a new high at USD 831.6 million, up 32% over FY22's USD 629.27 million. Indonesia is the largest buyer of Indian groundnuts accounting for over a third of the shipments, followed by Vietnam, Philippines, Malaysia, and Thailand among others. Other large buyers include UAE, Bangladesh, Iran, China, Afghanistan, Russia, and Nepal[38].

Rationale for Choosing Groundnut in Bundelkhand Region

- Existing volume (the marketable surplus or market arrivals in mandis was 2.7 lakh MT in 2022-23)
- Growing area (while the planned cropped area in Jhansi was 28,554 hectares in 2022-23, the actual area was 1.3 lakh hectares)
- Ready market (groundnut from Bundelkhand is shipped to Gujarat)
- Opportunities for value addition[39] (such as deshelling)
- Use of biproducts (groundnut shell) for fuel at a good price (INR 5 / kg ex-factory)

Possible Interventions in Groundnut

- Introduction of improved varieties for yield and quality to meet market demand
- Setting up of seed system
- Crop management
- Facilitating processing industry (land, electricity, finance, and other regulatory issues - deshelling not covered under food processing)
- Forward integration for direct sales (both domestic and international) by attempting disintermediation
- Handling food safety issues (management practices, post-harvest practices, scientific storage, lab analysis – encourage private sector)
- Facilitating export logistics (connecting with nearby Inland Container Depots in Gwalior and Bhopal)
- Marketing activities (export facilitation – linkage with end users) – after 1-2 years

[34] Mordor Intelligence Report
[35] Statista online database
[36] Statista online database
[37] Zee Business on the basis of Ministry of Agriculture data
[38] Indian groundnuts gaining overseas markets on robust SE Asia demand, The Hindu Businessline, Jul 17, 2023
[39] Further, as per GoUP data, the seed replacement rate for groundnut is 24%, which is an opportunity for intervention

Annexure 4: Summary of UP-AGREES Grant Fiduciary Procedures

Component	Activity	Amount (in US$ Million)	Contractual arrangements between project and Grant Beneficiary	Flow of Funds	Eligible Expenditure for Disbursement from the Bank	Fiduciary Oversight (Accounting, Financial Reporting and Audits)
1.1	Startup grants to Farmer Producer Groups (30750 Nos) **Activities:** Crop residue management and laser land leveling	US$7.4M	MoU will be signed between Project and nodal Farmer Producer Organization (FPO) / Farmer Producer Company (FPC).	FPG will open a bank account. Funds will be electronically transferred by PMU into the FPG Bank Account after approval of work plan by FPO and project.	Grants disbursed by PMU to FPG will be considered for World Bank disbursement in IFR.	Nodal FPO will supervise the functioning of member FPG. Utilization of funds and performance of FPGs will also be monitored by DPIU. UC will be obtained from FPG on use of funds. NGOs hired by the DPIUs will have one accountant who will assist FPG on maintaining basic books and registers.
1.1 ********** 1.3	Financial Assistance provided to FPO's (125 Nos) for Custom Hiring Centers (CHC) **Activities:** Procurement of farm machinery (rotavator, zero till drill, multi crop planter, power weeder, chaff cutter etc) Capital Assistance to FPO (210 Nos) for purchase of assets and creation of infrastructure	US$1.8M US$2.53M	MOU / Contract will be signed between project and individual FPO	Funds will be electronically transferred by PMU into the FPO Bank Account after approval of business plan / activity by project.	Grants provided to FPO will be treated as advance in the project books and expenses will be accounted on receipt of UC from FPO. The amounts will be claimed from the World Bank in IFR on receipt of UC from FPO.	Utilization of funds and performance of FPO will be monitored by DPIU. FPO will hire an accountant (if existing person not available) to maintain books and registers on use of funds. UC and annual audit report will be provided by FPO to Project.
1.2	Working Capital Support to seed producing FPO's (56 Nos) to meet financing gap	US$1.7M	MOU / Contract will be signed between project and individual FPO.	Funds will be electronically transferred by PMU into FPO Bank Account after approval of	Grant disbursed by PMU to FPO will be treated as advance in project books and expenses will be accounted on	Utilization of funds and performance of FPO will be monitored by DPIU. FPO will hire an accountant (if existing person not

Component	Activity	Amount (in US$ Million)	Contractual arrangements between project and Grant Beneficiary	Flow of Funds	Eligible Expenditure for Disbursement from the Bank	Fiduciary Oversight (Accounting, Financial Reporting and Audits)
				business plan / activity by Project.	receipt of UC from FPO showing one time use / rotation of funds to finance activities approved under business plan. The amounts will be claimed from the World Bank in IFR on receipt of UC from FPO.	available) to maintain books and registers on use of funds. UC and annual audit report will be provided by FPO to Project.
2.1 & 2.2	Grants to registered entities (MSMEs, individual enterprises, or farmer & Fisheries collective) **<u>Activities:</u>** Construction of storage, warehouse, and food processing, fish processing facilities based on Cluster Development Plans. Funding will be on a pre-defined ratio (e.g. 60% by registered entity and 40% by project)	US$28.6M	The project will issue bids inviting proposals from registered entities. The project will sign contract with the selected entity.	The selected entity will furnish bank account details (in the name of the entity). Funds will be electronically transferred by PMU into the bank account of the selected entity in tranches based on payment schedule of contract. Subsequent tranche will be released by PMU to the entity only on receipt of UC for the previous tranche.	Amounts released by PMU to the entity will be treated as advance in the project books and expenses will be accounted on receipt of UC from the selected entity. The amounts will be claimed from the World Bank on receipt of UC from the selected entity.	Construction works will be supervised by PMC hired by PMU under this project. Invoices for the works and UC provided by the entity to the Project will be certified by PMC. Project auditor of PMU will do ex-post review of these documents during year-end audit.
3.2	Alternate Investment Fund (AIF) Activity: Investments in Agri SMEs (equity / debt / hybrid)	US$19.2M	Contract will be signed between the project and SEBI registered AIF fund manager. Detailed guidelines will be developed during project implementation.	Funds will be electronically disbursed by PMU into the Bank account opened by AIF. The capitalization will be done in	The expenditure will be recognized in books at the time of release / capitalization of fund by project. Funds disbursed to AIF will be	Fund Manager will provide details of investments made in Agri SMEs. Annual Audit Report will be provided to Project.

Component	Activity	Amount (in US$ Million)	Contractual arrangements between project and Grant Beneficiary	Flow of Funds	Eligible Expenditure for Disbursement from the Bank	Fiduciary Oversight (Accounting, Financial Reporting and Audits)
				tranches based on investment proposals approved by the fund manager.	eligible for World Bank disbursement in IFR.	
3.2	Challenge Fund to Agri Market Players / Institutions.	US$3.6M	Business proposals will be invited to address specific challenges faced by the project (component agnostic). Private / public entities will submit proposals, which will be evaluated by the PMU. After carrying out the due diligence and appraisal of the proposal, a project will sign contract with selected entity.	Funds will be electronically released by project into Bank account of Institutions based on payment schedule (outputs / deliverables) stated in signed contract.	The expenditure will be recognized in project books at the time of release of funds to Institutions. Funds disbursed to Institutions will be eligible for World Bank disbursement in IFR.	Project auditor of PMU will validate that funds are released by PMU to Institutions as per T&C of the Contract.

Annexure 5: Interim Financial Report Formats

IFR-1: Sources & Uses of Funds

Uttar Pradesh Agriculture Growth And Rural Enterprise Ecosystem Strengthening Project				
Interim Financial Report - 1				
Period From ……. to …….				
Loan No:				
Sources & Uses of Funds				
Sl No	**Description**	**For the Quarter**	**Year to Date**	**Cumulative to Date**
Sources of Funds				
A	**Opening Balances**			
A.1	Cash and Bank			
	- at SPMU			
	- at DPIU			
A.2	Advances to FPOs			
	- at SPMU			
	- at DPIU			
	Total Opening Balances (A)			
B	**Receipts**			
B.1	Funds received from GoUP			
B.2	Other receipts			
B.3	Refunds (if any)			
	Total Receipts (B)			
	Total Source of Fund (A+B)			
Application of Funds				
C	**Project Expenditure by Components**			
1	Component 1: Productivity Enhancement			
2	Component 2: Commodity Clusters			
3	Component 3: Digital and Financial Ecosystems			
4	Component 4: Project Management, Learning, and Partnerships			
5	Component 5: Contingent Emergency Response Component (CERC)			
	Total Project Expenditure (C)			
D	**Mobilization Advance / Deductions (eligible under bank finance)**			
D.1	Advance / Current assets (eligible under bank finance)			
D.2	Deductions / Current liabilities (eligible under bank finance)			
	Total impact of Mobilization / Deductions (D)			
	Total Application of Fund (C+D)			
E	**Closing Balances**			
A.1	Cash and Bank			
	- at SPMU			

	- at DPIU
A.2	Advances to FPOs
	- at SPMU
	- at DPIU
	Total Closing Balances (A+B-C-D)
This is to confirm that the above expenditure is in agreement with the books of accounts of the project and the supporting documents are maintained in the SPMU and DPIU.	
General Manager (Finance)	
UP-AGREES	

IFR-2: Project Expenditure by Category

Uttar Pradesh Agriculture Growth And Rural Enterprise Ecosystem Strengthening Project				
Interim Financial Report - 2				
Period From ……... to ……..				
Loan No:				
Project Expenditure by Category				
Sl No	**Category**	**For the Quarter**	**Year to Date**	**Cumulative to Date**
1	Goods			
2	Works			
3	Consultancy Services			
4	Non-Consulting Services			
5	Operating Cost			
6	Grants			
7	Capital Contribution to AIF			
	Total Project Expenditure			
This is to confirm that the above expenditure is in agreement with the books of accounts of the project and the supporting documents are maintained in the SPMU and DPIU.				
General Manager (Finance)				
UP-AGREES				

IFR-3: Project Expenditure by Components

Uttar Pradesh Agriculture Growth And Rural Enterprise Ecosystem Strengthening Project				
Interim Financial Report - 3				
Period From ……... to ……..				
Loan No:				
Project Expenditure by Components				
Sl No	**Components**	**For the Quarter**	**Year to Date**	**Cumulative to Date**
1	**Component 1: Productivity Enhancement**			
1.1	Sub-Component 1.1: Resource-Use Efficiency for Productivity Enhancement			
1.2	Sub-Component 1.2: Mechanisms for Improved Seed System			
1.3	Sub-Component 1.3: Strengthening Extension Services for Tailored Climate-Smart agronomic Practices			
1.4	Sub-Component 1.4: Leveraging Carbon Markets			
2	**Component 2: Commodity Clusters**			
2.1	Sub-Component 2.1: Crop Clusters			
2.2	Sub-Component 2.2: Fisheries			
2.3	Sub-Component 2.3: Integrated Export Hubs			
3	**Component 3: Digital and Financial Ecosystems**			
3.1	Sub-Component 3.1: Digital Architecture and Technology Services			
3.2	Sub-Component 3.2 : Agri Finance Ecosystem			
4	**Component 4: Project Management, Learning, and Partnerships**			
4.1	Establishment and operation of the SPMU			
4.2	Establishment and operation of the DPIU			
4.3	Project monitoring, evaluation & safeguards activities			
4.4	Project communication, partnership and convergence activities			
5	**Component 5: Contingent Emergency Response Component**			
	Total Project Expenditure			
This is to confirm that the above expenditure is in agreement with the books of accounts of the project and the supporting documents are maintained in the SPMU and DPIU.				
General Manager (Finance)				
UP-AGREES				

IFR-4: Claims Reimbursement Status

Uttar Pradesh Agriculture Growth And Rural Enterprise Ecosystem Strengthening Project
Interim Financial Report - 4
Period From ……... to ……..
Loan No:
Claims Reimbursement Status
Expenditure for the Period
Less: Ineligible expenditure, if any
Total Expenditure for the Period
World Bank share of the above @ 70%
Bank fund received till date
Total Project Expenditure till date
Less: Ineligible expenditure, if any
Total Eligible Project Expenditure till date
World Bank Share of the above @ 70%
Excess/(Short) utilization of fund
This is to confirm that the above expenditure is in agreement with the books of accounts of the project and the supporting documents are maintained in the SPMU and DPIU.
General Manager (Finance)
UP-AGREES

IFR-5: Grant Statement

Uttar Pradesh Agriculture Growth And Rural Enterprise Ecosystem Strengthening Project								
Interim Financial Report - 5								
Period From …….. to ……..								
Loan No:								
Grant Statement								
Sl	**Grant Beneficiaries**	**Grant Proposal Approved**	**Activity**	**Grant released for the period**	**Grant released for FY**	**Cumulative Grant released**	**Expenditure Incurred by Beneficiary**	**Unspent Funds**
			Total					
Expenses reported in the statement are based on Utilization Certificate submitted by Grant beneficiary. The records are available at SPMU for review.								
General Manager (Finance)								
UP-AGREES								

IFR-6: Capital Contribution to AIF

Uttar Pradesh Agriculture Growth And Rural Enterprise Ecosystem Strengthening Project							
Interim Financial Report - 6							
Period From …….. to ……..							
Loan No:							
Capital Contribution to AIF							
Sl	**Agri-tech, Climate-agri startups**	**Investment Plan/ Proposal Approved**	**Tranche Disbursement**			**Expenditure incurred by Agri-MSMEs**	**Activities funded**
			Tranche released for the period	**Tranche released for F.Y.**	**Cumulative Tranche released**		
Amounts reported in the statement are based on reports submitted by AIF.							
General Manager (Finance)							
UP-AGREES							

IFR-7: Contract Statement subject to prior review

Uttar Pradesh Agriculture Growth And Rural Enterprise Ecosystem Strengthening Project								
Interim Financial Report - 7								
Period From ……... to ……..								
Loan No:								
Contract Statement subject to prior review								
Contract No (STEP)	**Contractor Consultant Name**	**Contract Date**	**Contract Amount (Original)**	**Contract Amount (Revised)**	**Amount paid to contractor for the period**	**Cumulative Amount paid to contractor till date**	**%ge of cumulative expenses to contract value**	**Physical progress of work (in percentage)**
This is to confirm that the above expenditure is in agreement with the books of accounts of the project and the supporting documents are maintained in the SPMU and DPIU								
General Manager (Finance)								
UP-AGREES								