

SDG Blueprint for Sustainable Agriculture: Expert Consultation

Focus on SDG 9, SDG 11, and SDG 12

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Summary Document

SDG 9 (Industry, Innovation, and Infrastructure)

Expanding internet access in rural areas enables farmers to access market information, weather forecasts, and educational resources for sustainable farming practices. Improved network infrastructure allows for real-time communication, which is vital for crisis management in agriculture. User-friendly applications can include features like language support and intuitive navigation to ensure accessibility for all farmers. Enhanced user interfaces can incorporate voice commands and assistive technologies for farmers with limited literacy.

Advisory services can provide guidance on sustainable farming methods, crop diversification, and risk management. Weather advisories can help farmers prepare for extreme weather events, reducing crop losses. Real-time information, such as market prices, helps farmers make timely decisions on crop sales and investments. It also aids in predicting and responding to disease outbreaks and pest infestations promptly.

Access to finance can include microcredit and insurance products tailored to farmers' needs, offering financial security in challenging times. Financial literacy programs can empower farmers to make informed financial decisions. Building trust between farmers and banks can lead to quicker loan approvals and lower interest rates, promoting sustainable investments. Technology can facilitate remote transactions, reducing the need for physical visits to banks.

Extension services can include training programs on sustainable and organic farming practices. These services can also introduce innovative technologies like IoT-based crop monitoring. Collaborative research involving farmers, scientists, and agricultural experts ensures practical and effective solutions. Research can focus on developing drought-resistant crops and sustainable pest management techniques.

Incentivization models for insurance can offer premium discounts for farmers adopting sustainable farming practices. Insurance should cover crop losses due to climate-related events, pests, and diseases. Price stabilization mechanisms, such as commodity boards, can protect farmers from sudden price crashes. Diversifying crops and value-added products can reduce the impact of price volatility. Investment in R&D can lead to the development of climate-resilient seeds and efficient agricultural machinery.

Sustainable agriculture research can focus on reducing the carbon footprint of farming. By merging similar schemes, resources can be utilized more efficiently, benefiting a broader section of farmers. This approach reduces administrative overhead and streamlines program delivery.

Subscription models can be replaced with freemium models that offer basic features for free and charge for premium services. Collaboration with mobile service providers can provide free

access to agricultural apps in certain regions. Strong data encryption and privacy policies can assure farmers that their information is secure. Transparency in data usage and storage can build trust and encourage data sharing.

Modern technologies like precision agriculture and IoT sensors can optimize resource use, reduce waste, and improve yields. Cleaner fuels and renewable energy sources can make farming more sustainable. PPPs can fund large-scale infrastructure projects, such as irrigation systems and cold storage facilities, benefiting both farmers and private investors. Joint initiatives can drive innovation in agriculture by leveraging private sector expertise.

Issuing Intellectual Property Rights to farmers for their innovations can incentivize creative solutions and improved agricultural practices. Collaborative platforms can facilitate the sharing of ideas and innovations among farmers. Resource retrofitting includes the upgrade and efficient use of existing agricultural machinery and structures. This approach minimizes waste and promotes sustainability.

Promoting agriculture as a respectable and economically viable profession can attract more youth to farming. Public education campaigns can create awareness about the importance of agriculture in achieving food security and sustainability. On-site processing centers, like mobile mills or food processing units, reduce transportation costs and post-harvest losses. They also enable farmers to access value-added opportunities for their produce.

Developing new agricultural products can open up diverse markets, such as organic foods, herbal medicines, and artisanal crafts. Market research can identify niche opportunities for farmers to explore. Cooperative models for credit sharing can provide financial support to small-scale farmers who may not qualify for traditional loans. These models can strengthen local farming communities. Aligning R&D with market demand ensures that new agricultural technologies and products are practical and profitable. It reduces the risk of overproduction and waste.

Collaboration among industry players, universities, and research institutions can lead to holistic solutions for agriculture. Sharing knowledge and resources accelerates innovation. Converging schemes like AIF, APEDA, and PMFME can create a unified framework for agricultural development, avoiding redundancy and resource waste. This approach can harmonize efforts in areas like food processing and export promotion.

Promoting success stories like "Mera Gaon Mera Gaurav" can inspire other regions and communities to implement sustainable agricultural practices. These stories serve as practical examples of the benefits of such initiatives. FPOs can play a pivotal role in providing collective insurance coverage, financial services, and market access for their member farmers. Leveraging FPOs' collective strength can enhance their bargaining power in the agricultural market.

Portable post-harvest technology can empower farmers in remote areas to process their produce efficiently. Mobile processing units can reduce post-harvest losses and improve product quality. Investing in seed research can lead to the development of drought-resistant, high-yield varieties, crucial for sustainable agriculture. Biofortified seeds can enhance nutrition and food security. Reducing the reliance on agro-inputs can involve organic farming practices, integrated

pest management, and efficient resource use. Sustainable agriculture aims to minimize the environmental impact of these inputs. Location-specific market details can help farmers understand local demand, reduce transportation costs, and plan their crops accordingly. Mobile apps can provide real-time market information for precise decision-making.

Direct procurement from farmers by government agencies ensures fair pricing and reduces middlemen's influence. It promotes transparency and equitable income distribution in the agricultural value chain.

SDG 11 (Sustainable Cities and Communities)

The discussion deliberated on various issues and approaches to enhance sustainable agriculture in urban infrastructures.

Urban areas grapple with limited land availability, exacerbated by a constant influx of people from rural areas, further intensifying space constraints and hence making it challenging to allocate lands for agriculture. Focusing on peri-urban areas in the cities that are yet to urbanize by strengthening their infrastructures can alleviate some of the urban pressures.

The challenges posed by low roof strength and the prevalence of older buildings with limited bearing capacity in urban areas can limit the implementation of urban agriculture initiatives. It is important to involve the community in the planning and implementation of urban agriculture ideas. Encouraging residents to participate and share the responsibilities can help distribute and manage potential structural issues more effectively.

Shifting mindsets of urban residents towards more sustainable practices is a significant challenge. People often have habits and lifestyles deeply ingrained in the use of synthetic materials, such as plastic turf on their terraces, or backyard spaces that make it difficult for water to seep into the ground. Changing these behaviors requires a combination of education, awareness, and incentives.

Promoting behavioral changes can indeed foster more environmentally friendly practices. Awareness along with accessible alternatives can empower individuals and communities to make sustainable choices, contributing to a sustainable city. For instance, offering incentives to encourage food cultivation in residential complexes can promote self-sustainability.

Local governments can incentivize sustainable practices through policies and programs. These might include environmentally friendly renovations, rebates for water-harvesting infrastructures, or regulations that encourage the use of sustainable landscaping materials in cities.

There are several ecological implications due to concretization of cities. This adds to the challenge of water seepage and percolation, impact on micro flora and fauna, and making it more vulnerable to natural disasters. In city tree planting, the presence of stone or concrete encasements around trees hinders water infiltration, creating a challenging environment for tree growth. These impermeable barriers prevent water from nourishing tree roots. It highlights the need for more sustainable urban design that allows for proper water access, ensuring the longevity and vitality of urban trees while enhancing the overall environmental quality of cities.

Water scarcity in cities is a critical issue that is exacerbated by a combination of factors, including inefficient water management and the absence of rainwater harvesting provisions. Enacting regulations or incentives that require set-ups or construction for rainwater harvesting systems will encourage more residents to adopt it. Existing buildings can also be retrofitted with such systems. Public awareness campaigns to educate residents about the importance of water conservation and the need for efficient water use in cities can be strengthened.

The reluctance to learn from past mistakes and the lack of accessible information dissemination can indeed hinder the implementation of holistic solutions in urban spaces. There is a need to invest in training and capacity building for urban planners and policymakers, providing them with the knowledge and tools needed to design and implement holistic solutions. Also supporting educational programs that focus on urban sustainability and encourage students in schools to pursue agriculture-related activities especially in urban planning and related fields can be beneficial.

Sustainable practices that mimic natural ecosystems and foster biodiversity within the soilless systems (like hydroponics/aquaponics) can help bridge the gap between innovative farming methods and the preservation of the intricate relationships that exist in our natural environment. Despite offering innovations and advantages, there are several challenges related to hydroponics. Being a soilless farming method, hydroponics confronts economic hurdles due to initial setup costs. Additionally, potential ecological consequences like water wastage and nutrient management can be some of the key issues. Moreover, the adaptability of hydroponics to various climates varies, requiring modifications and controlled environments, which might not be feasible in all regions, particularly those with extreme weather conditions like India.

One of the significant challenges facing the expansion of aquaponics/hydroponics lies in the high cost of the water-based nutrient solutions required for these soilless farming methods. While these innovative techniques offer advantages such as reduced water usage and space efficiency, they also raise concerns about their ecological impact. By eliminating soil from farming practices (through wide adoption of hydroponics), there is a risk of disrupting the delicate web of life that thrives beneath the earth's surface).

The consequences of this disconnect between soilless farming and the natural environment can extend beyond the immediate context of agricultural production. The ecological landscape can deteriorate as numerous species that rely on soil for shelter, food, and reproduction may be displaced or threatened. This disruption can have a ripple effect on the broader ecosystem, impacting pollinators, decomposers, and other organisms critical for ecological stability.

Furthermore, the absence of soil in hydroponic systems can disrupt the natural nutrient cycling and microbial communities that play a pivotal role in nutrient availability and plant health in traditional soil-based agriculture. This, in turn, can lead to imbalances and nutrient deficiencies that necessitate the use of synthetic fertilizers, potentially undermining the sustainability benefits these systems aim to provide. In essence, while hydroponics offers promising solutions to address water scarcity and enhance food production in urban settings, they must be carefully managed to mitigate the potential ecological repercussions.

Initiatives for raising awareness and providing training in rainwater harvesting and green roof setups are crucial to conserving water resources and enhancing urban green spaces. Careful planning and effective implementation of efficient solar rooftops can significantly contribute to renewable energy sources.

The need to encourage agricultural activities in schools has been emphasized. It nurtures a strong connection between children and essential elements like food crops, nature, and soil, fostering environmental awareness. Involving children in hands-on activities like farming, composting, soil management instills values of environmental responsibility and sustainability from an early age.

There is a need to integrate agriculture into the education system's curriculum. This represents a long-term investment in cultivating sustainable practices and environmental consciousness among future generations. The example of Sow Good Farm schools was discussed. Sow Good Farms fosters nature-conscious children by promoting hands-on farming experience through integrating environmental care into the curriculum, offering a dedicated space for planting and nurturing. Children are given plots to cultivate, teaching them to sow seeds, create organic pesticides and fertilizers, and maintain their mini gardens. This initiative encourages a deep connection with the environment and sustainable living.

Transferring the responsibility for waste management from municipalities to residents can foster a sense of personal accountability for environmental practices, particularly the adoption of composting as an eco-friendly waste disposal method. This shift not only relieves the strain on municipal resources but also empowers individuals to actively engage in reducing organic waste and enriching soil quality through composting.

Fostering people-centric approaches that prioritize individual and community responsibility is essential to drive meaningful change. Empowering citizens to take ownership of their actions, from waste management to sustainable practices like composting and water conservation, is key to building a more environmentally conscious society.

Furthermore, enhancing land and water management in urban parks and open spaces plays a pivotal role in promoting environmental sustainability. By implementing effective land-use planning and adopting responsible water management practices, cities can conserve natural habitats, protect biodiversity, and ensure a more sustainable use of valuable resources, creating greener, more resilient urban environments.

The blind adoption of new technologies in India, without evaluating their compatibility or appropriateness, poses a significant barrier. Balancing innovation with the preservation of traditional knowledge is crucial for sustainable and culturally sensitive development like India.

A well-structured monitoring and evaluation system is essential for effective urban governance and sustainable development. Establishment of a robust monitoring and evaluation system, characterized by stringent adherence, is crucial. This system provides the framework for assessing progress, holding stakeholders accountable, and making data-driven decisions. By consistently measuring and reviewing the outcomes of environmental initiatives, cities can refine their strategies, optimize resource allocation, and ensure that sustainability goals are met, ultimately leading to more resilient and environmentally friendly urban environments.

It is essential to recognize that changing behavioral mindsets in urban dwellers takes time, and there is no one-size-fits-all approach. A combination of these strategies, tailored to the specific

needs and culture of the community, can help shift urban residents toward more sustainable practices.

SDG 12 (Responsible Consumption and Production)

A shift from biomass to solar power due to price competitiveness issues. Population, Unemployment, and Labor: Addressing the challenges posed by rising population, unemployment, and disguised labor in agriculture. Aligning prices with the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) rates.

The need to make eco-labeling demand-driven with price support, as consumers are not yet willing to pay extra for sustainability. Emphasizing the importance of schemes that are practical and effective, not just on paper. Ensuring accountability in the implementation of schemes. The necessity of clearly defining price elements in schemes.

Subsidy for Organic Fertilizer: Promoting organic fertilizers over chemical ones and addressing market feasibility and scaling issues. Addressing the issue of fertilizer runoff and its impact on soil and marine ecosystems.

Emphasizing the principles of regenerative agriculture to maintain soil health and ecosystem services. The need for comprehensive policy evaluations to identify shortcomings and move towards hybrid solutions.

Dealing with the challenges posed by India's large livestock population and the shift towards hybrid varieties. Examining the challenges of providing free electricity in the context of biomass and biogas production.

The challenges of land encroachment and distribution system disestablishment, affecting slurry management. Addressing the decline in soil microorganisms due to heavy chemical inputs. Emphasizing the importance of extension services in policy implementation. Highlighting the erosion of indigenous farming knowledge.

Discussing how policy recommendations can be effectively operationalized and ensuring accountability beyond extension agents. Recognizing that many private entities rely on funding and the importance of making a business case for sustainability. Discussing mechanisms for creating demand, such as incentivizing stubble collection. The need for adequate food storage infrastructure and addressing post-harvest food waste. Focusing on resource and circular economies discussed in G20 meetings.

The need for scaling up production of biofuels, biofertilizers, and organic fertilizers. An important scheme related to reducing fertilizer consumption. Emphasizing the importance of local markets and infrastructure. The role of digital platforms in connecting farmers with stakeholders.

The time required for yield recovery in organic farming and the challenges of farmer adoption. Recognizing the costs incurred in sustainable practices and the importance of compensating and providing support. Addressing the issue of compensation for land degradation due to conventional farming practices. Focusing on local post-harvest technology and cold storage facilities. Efforts to enhance post-harvest infrastructure and value addition in the northeast region of India.

Emphasizing the need for policy focus at various stages of implementation. Addressing challenges in biogas production, particularly related to slurry management. Recognizing that yields in organic farming may initially dip but improve over time. The need to balance in-situ and ex-situ management practices in agriculture.

The importance of extension workers in helping farmers in soil management. Acknowledging the responsible role played by organizations like TNC and WWF in crop residue management. Advocating for the return of crop residue to the farm.

Ensuring sufficient organic material is available to facilitate the shift to organic farming. Discussing potential issues with the calculation of organic material utilization.

Recognizing the role of farmers in innovating sustainable practices. The need for a holistic transition roadmap to support farmers in adopting sustainable practices.

Exploring the impact of market forces on promoting monoculture. Highlighting the challenges faced by Indian farmers in receiving lower prices compared to international averages. Recognizing the significance of proper soil management for sustainable agriculture. Discussing how agro-ecological farming can contribute to achieving Sustainable Development Goals (SDGs).

Acknowledging that a one-size-fits-all approach may not work, diverse package practices are needed. The importance of addressing gaps and challenges in the nascent stage of organic farming.

Emphasizing the role of digital platforms in connecting stakeholders in the agriculture supply chain. The challenges related to governance and coordination between central and state governments.

The need for tailored schemes to address the diverse agricultural requirements in India. Addressing quality issues related to organic input, including strains and infrastructure. Recognizing regional preferences for organic farming based on crops and local conditions.

The importance of gradually increasing the share of organic farming in the total agricultural landscape.

Focusing on raising awareness and improving cropping techniques in organic farming. Addressing challenges related to post-harvest losses and the need for modern storage facilities. Efforts to convert crop residue into usable products like manure. The potential of precision agriculture to optimize crop management.

The importance of diversifying income sources for farmers. The role of women in disseminating agricultural knowledge through training programs. The need for coherent policies across different sectors. Recognizing the importance of addressing social and economic equity in agriculture.

Promoting crop diversification and addressing issues like millet cultivation. The need for a holistic approach to transition to sustainable farming practices.

Balancing centralized and tailored schemes for various regions. Exploring the feasibility of gradually transitioning a portion of farming to organic practices. Addressing the gaps in awareness and cropping techniques for sustainable farming.

Recognizing the adverse effects of chemicals on natural plant immunity. Spreading Knowledge and Quality Inputs: The importance of knowledge dissemination and improving the quality of inputs. Addressing post-harvest challenges and the need for infrastructure. Efforts to convert crop residue into manure and other valuable products.

The potential benefits of precision agriculture in managing carbon emissions. Diversifying Income: The importance of diversifying income sources for farmers through allied agri-sectors. Women's Training Programs: Highlighting programs that train women to disseminate agricultural knowledge.

The need for policies to align across different sectors to address sustainability comprehensively.

- Sustainability Beyond Environmental: Acknowledging that sustainability includes social and economic equity.
- Crop Diversification Policies: The importance of supporting policies that promote crop diversification.
- Holistic Transition Approach: Advocating for a comprehensive transition approach to sustainable farming.