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Sustainable Natural Resource Management in Agriculture: A Geographical Perspective

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Abstract

Human have been using natural resources in their environment. Biodiversity, Land & Water were managed by human to be able to Survive in the hand diverse à eco regions of the world. These practice and processes and called Natural Resource Management. Natural Resource Management (NRM) is formally defined, as the practices for the Sustainable utilization and conservation of the natural resources ensuring nutritional and environmental security for present and future generations. Around 8,500 BC, humans started to plant grains instead of gathering them in the wild. This happened in the area the spans modern day Egypt, Israel, Turkey and Iraq which was known as fertile crescent. By 7,000 BC, humans began to domesticate animals such as sheep, pigs and goats. A thousand years later, they domesticate Cattle. Since then many innovative practices of cultivation and livestock rearing have been established. But the term Agriculture was Cloned for these practices much later only in the 15th-century. The cultivation of land for effective crop growth and raising of livestock. farmers engage directly in articulation by preparing soil and planting crop. Narrating those crops and preparing them soil in the market is also part of agriculture activities.

Keywords: Sustainable, Biodiversity, Articulation, Stalinisation

Introduction

Farmers also grow fodder, raise livestock. Mono-culture is cultivation of a single species of crop. Poly-culture is cultivation of multiple species of crops at the same time.

Silvia-culture is an agricultural system using domesticated trees. Agriculture helped humans to settle down in One place, use the land for production of Food. It was a major change from the nomadic lives that humans led till then. Perhaps the most Significant impact of agriculture on the natural environment is the transformation of landscapes. Hunter-gathers hunted their pray and obtained the food directly. Farming required people to work. Longer hours for the same amount of food. But farming increased food security. As farming spread, Competition for resources, particularly land and water, increased consequently, conflicts between Communities for control of those resources also increase. Agriculture led to the narrowing human fond base. Today, wheat, rice, corn, potatoes, sugar. Only handful of other grains and legumes account for the rest Animal raising depends primarily on cattle, pigs, poultry, and sheep. Agriculture provided secure access to food. It helped humans to develop the complex cultures seen today, to pursue science and to improve the quality of life for all humanity.

Importance of sustainable management of natural resources

Firstly, sustained agricultural productivity is closely linked to the quality of ecosystem services) benefits communities obtain from nature) that natural resources provide. For agriculture production, these include soil formation, erosion control and fertility, nutrient cycling, water provision and purification, pollination, pest control, carbon sequestration, resilience to natural disasters (drought etc). Loss of ecosystem services results in reduced productive capacity of farms and lower yields which affect the net incomes of farmers. Over-exploitation of natural resources is instrumental in the plating yields in irrigated agriculture systems. It perpetuates poverty and hunger in dry lands. Secondly, natural resources provide rural communities with fuelwood, fodder, food and other materials. They can be a source of non-farm income through ancillary activities such as tourism. Thus, conservation and appropriate use of land, water, biodiversity and forest resources is vital for sustaining the profitability of agriculture, maintaining livelihoods and social well-being in rural communities. There have been schemes to address natural resource use in relation to agriculture. These include programmes on soil health (the Soil Health Card Scheme being the most recent avatar), development of drought-prone and degraded lands, water conservation and watershed management (now part of PMKSY), rained areas development, activities under MNREGA etc. However, issues of underdeveloped institutional capacities, especially for decentralized planning and Implementation, low resource availability, lack of coordination, duplicity of efforts in the absence of convergence and gaps in monitoring have impeded translation of programme objectives to gainful outcomes.

What is under-appreciated is the agro-climatic diversity, socio-economic and cultural variability that farming communities harbour. An integrated and holistic view of natural resource management that also links with better agrarian outcomes is also missing.

Stress on natural resources

Land degradation and desertification that afflicts 30 per cent of the land is on the rise. Inappropriate agricultural practices are destroying soil fertility and leading to erosion, water logging, and Salinisation and soil compaction. Reports indicate that around 54 per cent of India falls under high and extremely high water stress regions and groundwater wells are decreasing. Farmers in several regions face acute water shortage. Since over 85 per cent of the groundwater is utilized by the agriculture sector, burgeoning ground water use based on subsidies, incentives for water-intensive crops and low water use efficiencies in agriculture are pushing the nation towards water scarcity. There is also erosion of agro-biodiversity seeds, crop varieties and livestock due to over-emphasis on select high-yielding varieties that poses a threat to food and nutrition security. The importance of tree species in enhancing farm health and farmers' nutrition is disappearing.

Management of natural resources

Operational land use planning and sustainable land management practices and multi-stakeholder dialogue is the key. Strengthening capacities, especially at block and district levels, for development of natural resource plans, implementation and ownership of the interventions are necessary. Plans need to be developed on the basis of the characterisation of the bio-physical resources, with an understanding of resource variability and dynamics and socio-economic realities. Secondly, a move away from resource management in silos to a systems approach that recognizes functional linkage between soils, water, biodiversity and forests and its impact on ecosystem services provided is needed. A re-emphasis on the watershed approach that integrates multiple resource use and conservation will be helpful. Thirdly, the association between sustainably managing biophysical resources and improved agricultural productivity and equity need focus. Emphasis must be laid on people's participation and the use of local knowledge and practices such that resource conservation measures are developed in ways that contribute to the socio-economic well-being of communities. Agriculture operates on a multifunctional scale. While its social and economic functions are important, its ecological functions and impacts are also significant. Unless the natural resource base is managed sustainably and in ways that benefits the local populations, improves system productivity, cultivates agro-ecosystem resilience and maintains ecosystem services, long-term gains from agriculture development for the economy, farmer livelihoods and rural development will not be possible. In the fortunes of agriculture, therefore, requires policies and institutional arrangements that pay heed to farmers as well as the needs of the environment.

Better use of natural resources

(1) Natural resources, especially those of soil, water, plant and animal diversity, vegetation cover, renewable energy sources, climate, and ecosystem services are fundamental for the structure and function of agricultural systems and for social and environmental sustainability, in support of life on earth. Historically the path of global agricultural development has been narrowly focused on increased productivity rather than on a more holistic integration of NRM [Natural Resource Management] with food and nutritional security. A holistic, or systems-oriented approach, is preferable because it can address the difficult issues associated with the complexity of food and other production systems in different ecologies, locations and cultures. AKST [Agricultural Knowledge Science and Technology] to resolve NRM exploitation issues, such as the mitigation of soil fertility through synthetic inputs and natural processes, is often available and well understood. Nevertheless, the resolution of natural resource challenges will demand new and creative approaches by stakeholders with diverse backgrounds, skills and priorities. Capabilities for working together at multiple scales and across different social and physical environments are not well developed. For example, there have been few opportunities for two-way learning between farmers and researchers or policy makers. Consequently farmers and civil society members have seldom been involved in shaping natural resource management policy. Community-based partnerships with the private sector, now in their early stages of development, represent a new and promising way forward.

(2) Use existing AKST to identify and address some of the underlying causes of declining productivity embedded in natural resource mismanagement, and develop new AKST based on multidisciplinary approaches for a better understanding of the complexity in NRM. Part of this process will involve the cost effective monitoring of trends in the utilization of natural resource capital.

(3) Strengthen human resources in the support of natural capital through increased investment in research, training and education, partnerships, policy in promoting the awareness of the societal costs of degradation and value of ecosystem services.

(4) Promote research to facilitate less exploitative NRM and better strategies for resource resilience, protection and renewal through innovative two-way learning processes in research and development, monitoring and policy formulation.

(5) Create an enabling environment for building NRM capacity and increasing understanding of NRM among stakeholders and their organizations in order to shape NRM policy in partnership with public and private sectors.

(6) Develop networks of AKST practitioners (farmer organizations, NGOs, government, private sector) to facilitate long-term natural resource management to enhance benefits from natural resources for the collective good.

(7) Connect globalization and localization pathways that link locally generated NRM knowledge and innovations to public and private AKST.

(8) When AKST is developed and used creatively with active participation among various stakeholders across multiple scales, the misuse of natural capital can be reversed and the judicious use and renewal of water bodies, soils, biodiversity, ecosystem services, fossil fuels and atmospheric quality ensured for future generations.

Conclusion

Natural resources, especially those of soil, water, plant and animal diversity, vegetation cover, renewable energy sources, climate, and ecosystem services are fundamental for the structure and function of agricultural systems and for social and environmental sustainability, in support of life on earth. The cultivation of land for effective crop growth and raising of livestock. farmers engage directly in articulation by preparing soil and planting crop. Narrating those crops and preparing them soil in the market is also part of agriculture activities. sustained agricultural productivity is closely linked to the quality of ecosystem services that natural resources provide.

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Conflicts of interest

The authors declare that there are no conflicts of interest regarding the publication of this paper

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