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Sustainable Development of agriculture in India. A case study of Bihar state

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1. Introduction

The current study deals with the climate variability results in economic and food security risks in Bihar state of India and remainder of other part also because of its significant influences on agriculture. within the Bihar state, where agriculture is underachieve due to monsoon dependence and out of the one hundred pc only 30 percent is fed by canal water. Climate is changing and its effects on agriculture are uncertain, and to induce maximise output and to improving their livelihood within the main constraint, there's need for accurate forecast and data. because of this the dependency of the agriculture sector on monsoon correlates accurate weather forecasts with high demand. The key think about all agriculture policy is that the meteorology information which involves enhancing farm risk management. The analysis showed that a 75% accuracy of agro-meteorological information is important for the agro-meteorological information to be worthwhile. However, challenges are there to the uncertainty of climate forecasts and to the complexities of agricultural systems.

With about 2-8 per cent of geographic region Bihar supports nearly 8 per cent of human and 15 per cent of animal population of the country. Rural population constitutes about 89.5 per cent of total population in Bihar. The State is that the least literate (47%) and 42 per cent population is toiling livelihood below personal income. Agriculture continues to be the most occupation of the bulk of rural households (69%) which contributes one-third to State gross domestic product and provides employment to three-fourths working population in Bihar against only 55 per cent within the country. During last 25 years there has been minute change in proportion of agricultural worker to total labour force but number of agricultural labours increased from 126 lakh in 1981 to 265 lakh in 2006 whereas net sown area declined by quite one lakh hectares during the period, mainly thanks to use of agricultural land for non-agricultural use and degradation of land.

2. What required for sustainability

Sustainable development has been defined variously. II is usually considered, as a development that meets the wants of the current without compromising the flexibility of future generations to fulfil their own needs. It ascribes to a development, which is environmentally non-degrading, technically appropriate, economically viable and socially acceptable. Sustainable development has been widely accepted as an idea that has got to be central for future human endeavours. As evident from the above definition, this idea embodies two basic functions:

- Economic Development, and
- Ecological Sustainability

Both notions must be handled positively for any sustainable development to happen. Unfortunately, some environmentalists tend to specialise in ecological issues and ignore those associated with economic development and also the same is also true for vice-versa. Any agricultural development project/programme is actually a sustainable one that continues to control successfully even after withdrawal monetary and or technical support to the programme without degrading the environment. because the problem of-agriculture development is in-situ and artificial, the people of the reg ion hold the key for its effective management.

This emphasises the importance of community participation for sustainability in agricultural development programmes. we've got to seem for active people p rather than the participation being only passive.

Better participation are often ensured at the later stages of the pre-gramme only by identifying and designing t!1e programme, which is suitable to the people and is environmentally benign. Involving an outsized number of farmers both male and feminine form the outset of the design and development of agricultural projects coupled with substantial training ensures large-scale adoption.

- Peoples participation right from pre-planning stage Community empowerment including integration of women in project activities.
- Local level people's institution.
- Capacity building of the institution and its actors.
- Resource generation or capital for sustenance.
- Belief of deriving tangible benefits form development of PPRs and CPRs
- Linkages with credit and input institutions and technical and scientific support organisations.
- Suitable withdrawn Strategy.
- All these would mean integration of Social Resource
- Management with resource Management for achieving sustainable results given emphasis to protection/conservation, production measures and social and livelihood support activities.

3. Cropping Systems Management under Different Agro-ecological Situation

The climate of the region is sub-tropical, hot and humid . The Bihar plains are richly endowed with two basic natural resources- lands and water, and are most fertile plains of the country. Rainfall varies from 1110 mm and 1,400 mm in south Bihar (alluvial Plain zone)north eastern plain zone respectively. although the region has rich rain, surface and water resources, they're grossly under-utilised, with the massive proportion of the cultivated area doesn't receive any irrigation water, and

therefore the farmers rely upon the vagaries of the monsoon f'or crop production. During 1992-93, only 43 per cent of the online cultivated area in Bihar was irrigated as compared to 95 percent area irrigated in Punjab. Owning to poor utilisation of water resources, the cropping intensity.in Bihar is low, consequently, large tracts of cultivate land during rabi season, a comparatively disease free season endowed with many sunshine remains fallow. As sizeable a part of the cultivated area in Bihar don't have provision for assured irrigation, therefore, even short spell drought adversely affects the steadiness of agricultural production thereby leading to low productivity. Its overall effect is that the agricultural development is way below its potential; with the result, the utilisation in agriculture sector is restricted and huge proportion of the population remains below the poverty level and suffers from malnutrition.

The ,uniqueness of the ecological and also the socio-economic environment of Bihar merit speed efforts towards generation of technologies relevant to the prevailing bio-physical and socio-economic environment by taking stock of dominant problems, resources and desires of the region. it'd require broad-based institutional framework to handle diverse issues associated with land and water resources management, crop husbandry, crop improvement, horticulture, fishery, livestock and poultry machine development, agro-processing and socio-economic paradigms in an exceedingly holistic manner.

4. Sustainable cropping in different ecosystems

Even though the region is that the resource rich and supports several agricultural production Systems, it's low agricultural productivity. The state of Bihar as per 1996-97 agricultural statistics, possessed about 7.3% of that total graduated in ny the country but produced about 7.1% (14.13 m tonnes) of the full food grains. the typical yield of food grains within the State was 1560 kg/ha. Among the food grains , rice is that the major crop occupying almost the full area during kharif ; the opposite important crop being wheat in rabi. Area under rice and wheat in Bihar was 5.07 m ha and a couple of.13 m ha respectively. The yield of rice in Bihar was 14.27q/ha as against national average of 18.8q/ha. Similarly, the yield of wheat was 2 1.68 q/ha as against the national average of 26.7 I q/h11. Area under pulses has shown a decline from 1.2 m/ha to 0.97 m/ha (17.2 per cent). However, the yield of pulses has increased by 7 per cent and has reached grade of 8.3q/h as against national average of 6q/ha. Bihar has considerable area under rice-fallows which may be brought under rice-based cropping systems if water resources are developed for irrigation.

The sub-humid ecosystem ofBihar is predominated with the cropping systems of rice-wheat, rice-wheat- sugarcane, rice-gram, rice-lentil and rice-mustard in low lands, while within the uplands; maize-wheat, pulse-wheat and sorghum-potato-fodder are the promising ones both for rain-fed and irrigated conditions. Rice-wheat could be a dominant production system within the Indo-Gangetic Plain, but then, the research issues are on sustaining its productivity at high level, which might require balanced nutrient application and improved crop and water management practices. To maximise the output of the system, more intensive on-farm analysis in production constraints and development of suitable farm technology are necessary.

5. Efficient Natural Resource Management

India is endowed with a chic and vast diversity of natural resources, particularly soil, water, weather, multipurpose trees and agro-biodiversity. so as to grasp the potential of productions systems on a sustained basis, efficient management the potential of production systems on a sustained basis, efficient management of the resources is extremely crucial. With the arrival of high yielding crop varieties, augmentation of irrigation facility, increased use of fertilisers, adoption of improved agronomic practices, concerted efforts of researches, planners, government, and specially of farming community, revolution was caused within the mid I960's. This led to a quantum jump in cereal production form 51 Mt in 1950-51 record figure of 203 Mt in 2001-02. The impressive achievement has pulled the country out of the " ship to mouth stage" and has led it to self-sufficiency. With adoption of-intensive agriculture to fulfil the numerous growing demands for fuel, fibre, feed, fertiliser and other products within the recent years, the natural resources are, however, anaesthetise intense strain leading to fast degradation and lowering oft heir production efficiency.

6. Efficient Watershed Management: An Overview

Land and water go together and their development can't be considered independent of every other for sustainability of rain-fed areas. Conservation and management of rainwater hold. key for sustainable agriculture in rain-fed areas. it's also been amply demonstrated in India et al that it's impossible to envisage or implement sustainable solutions for land and water resource development and management without active and full participation of area people. Development of land and water along with sustainable production system when confined to small natural drainage unit like watershed ends up in sustainable development. · Watershed Management (WSM) has, therefore, emerged as a brand new paradigm for planning, development and management of-land, water biomass resources with a spotlight on social and institutional aspects from bio-physical aspects following a participatory " bottom-up" approach. Sustainable production depends considerably upon proper development, conservation, management and use of watershed resources at .micro-level. Watershed management become increasingly important as a system approach to enhance livelihood of individuals while conserving and regenerating their natural resources. The role and importance of community participation in ensuring the success and sustainability of watershed management is now widely accepted.

7. Conclusions

The farmers obtain highest output and improve their liveli-hood within the most limitation as dependence on rain-fed agriculture, therefore having access to forecast information is extremely important. it's an urgent need of metrological report that's easily accessible and understand- ready to the farmers. The delivery of the weather information should be a key consider all the agricultural policies and discussions in enhancing farm risk management. As complexities of

agricultural systems and therefore the uncertainties of climate forecasts recommended that a coordinated effort is required if this technology is to be routinely employed in agriculture within the future. during this regard there's a desire to extend complementarily among information, technology and public intervention by; improved information on agro climatic potential i.e., a greater range of measurement, more computer–based analysis, more agro climatic screening of environments to match agricultural activities to regional weather–types and improve prediction or by improved use of recent agricultural technologies (such as high–yielding varieties) to extend production potential in good years and reduce losses in poor years; a spotlight on integrated regional development to scale back overall vulnerability to drought by increasing pub- lic awareness; and development of a consistently applied and widely known set of drought policies to cut back the uncertainty that stems from impromptu public intervention. This present study provide insight story of determinants to use of climate information associated with perception and communication, and a few evidence that improved presentation may overcome a number of the barriers and enhance utility. The weather information should be by the agro- meteorological stations before one or two month before the onset of the time of year that may allow the farmers to vary critical decisions like crops sowing schedule, crop varieties, cropping ratio, intensification of production, allocation of labour and capital. The results of the analysis showed that a 75% accuracy of meteorological information is important for the meteorological information to be worthwhile. Moreover the weather information forecasted by the agro-meteorological can support to plan a wise fertiliser subsidy programme additionally as smart improved seed programme. Moreover, the findings of this study have contributed interesting additional re- search hypotheses, and have influenced the event of several research larger proposals.

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