

## **Agricultural Extension and Rural Environment: Focus on Water Resource Influencing Lives and Livelihood**

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### **ABSTRACT**

*Agricultural extension with its basic philosophies, scope, principles and applications strive to support the existing rural environment encompassing livelihoods: social, physical, financial, human and natural (natural resources) capitals to a great extent. Farming systems vary with agro-ecological conditions and no single intervention will work as a magical cure for improving farm productivity. Revival of agricultural dynamism calls for corrective steps to deal with the near collapse of the extension systems in most states and the decline in agricultural research universities. The technologies and approaches with 'top-down', technology-driven projects: local, decentralized, community-based, people-centered alternatives are available. Problems of scarcity of water, depleted aquifers, declining groundwater tables, and drought proneness have been successfully tackled by water harvesting endeavors in Ralegan Siddhi village in Maharashtra, Sukhomajri in Haryana, and Alwar in Rajasthan only the need of the hour is to properly revive our old conventional systems for sustainable future and livelihood.*

**Key words:** Water resources; Environment; Rural People centered;

### **METHODOLOGY**

**R**ural environment represents the framework of regulations, institutions, and practices in villages defining parameters for the sustainable use of environmental resources while ensuring security of livelihood and a reasonable quality of life. While the scope of environmental infrastructure is often narrowed down to the provision of suitable water supply, sewerage, and sanitation it has within its purview (a) acquisition, protection, and maintenance of open spaces, (b) clean up and restoration of degraded lands, (c) integration of existing wildlife or habitat resources, (d) sustainable approaches to controlling flooding and drainage, (e) developing river corridors and coastal areas, and (f) forest management. Rejuvenation of natural resources through activation of watersheds, renewal of wastelands along with enhancement of farm productivity, is a component of environmental infrastructure that is attaining increasing importance as expanding anthropogenic activity stresses natural resources beyond their natural regeneration capability. The focus here is on natural resources, common properties, and rejuvenation of rural environment, especially the water resource.

The study was undertaken in the year 2008-09 in the nearby villages of Banasthali Vidyapith in the Tonk district of Rajasthan State. The researcher utilized the qualitative data interpretation methodologies for deriving analytical conclusions from 120 respondents. The data gathered for this analysis came from the written applications where candidates were asked to state their perspective of the most important issues concerning the rural environment with focus on water resources in 200 words or less. Responses were taken using the written/essay method or oral interviews. The grounded theory approach was used for analysis and interpretation of the data. Grounded theory is an inductive approach to data analysis that results in conclusions that are deeply rooted in the data (Strauss & Corbin, 1998). When using grounded theory methods for analysis, theory genus is taken from the data collected for a specific study; hence no literature review was reported in this study as to not establish a prior cause and effect relationships among the variables. The researchers began this analysis with the intent of better understanding participants' awareness and exposure to issues that influenced their lifestyle, agriculture, information sources, awareness, community and water resources.

When constructing grounded theory, the emphasis was placed on building rather than testing theory through deductive hypothesis testing. The researchers considered alternative meanings of phenomena in a systematic and creative process.

## RESULTS AND DISCUSSION

*Personal and Socio Economic characteristics of the respondents:* The result presented in table 1 indicated that majority of the respondents (54.17%) were middle aged. With regards to level of education, it could be observed that 41.67 percent of the respondents studied up to primary level, followed by 32.50 percent of them had middle school education. It was also observed that 46.67 percent of respondents belonged to small farmers category followed by 42.50 percent under semi medium farmers category. Farmers possess land holding from their ancestors and carry further the farming occupation with the major dependency on agriculture and water resources for their livelihood and income generation. As a result, it is quite possible that farmers with their land holding evince keen interest to know about the new ideas and technologies and try to coordinate their resources to get the maximum results out of their holdings and continuously depleting water resources. It was also found that 45 percent of the respondents belonged to medium income category followed by 33.83 and 24.16 percent of the respondents who belonged to low and high income category respectively. Most of the farmers were having 2.51 to 5.00 acres of land and agriculture was the major source of income. They lacked the subsidiary occupations also.

*Scenario of the Rural Environment:* The ecosystem within which all rural activities are conducted encompasses the air, the water bodies, and the land. India supports approximately 16 per cent of the world population and 20 per cent of its livestock on 2.5 per cent of its geographical area, making its environment a highly stressed and vulnerable system. The pressure on land has led to soil erosion, water logging, salinity, nutrient depletion, lowering of the groundwater table, and soil pollution—largely a consequence of thoughtless human intervention. The extent of land degradation, the loss in capacity of our major water reservoirs and the decline in water level in wells in the past few years is alarming. Soil erosion from overgrazing, and intensive cultivation and soil degradation from excessive use of agricultural chemicals, have wide-ranging implications.

Agricultural activities that cause land degradation include shifting cultivation without adequate fallow

periods, absence of soil conservation measures and cultivation of fragile lands, unbalanced fertilizer use, faulty planning or management of irrigation. Improper agricultural practices are usually observed under constraints of saturation of good lands and population pressure leading to cultivation of 'too shallow' or 'too deep' soils and ploughing of fallow land before it has recovered its fertility. Overgrazing and over-extraction of green fodder lead to forest degradation through decreased vegetative regeneration, compaction of soil, and reduced infiltration and vulnerability to erosion.

Table 1. Personal characteristics of respondents (n=120)

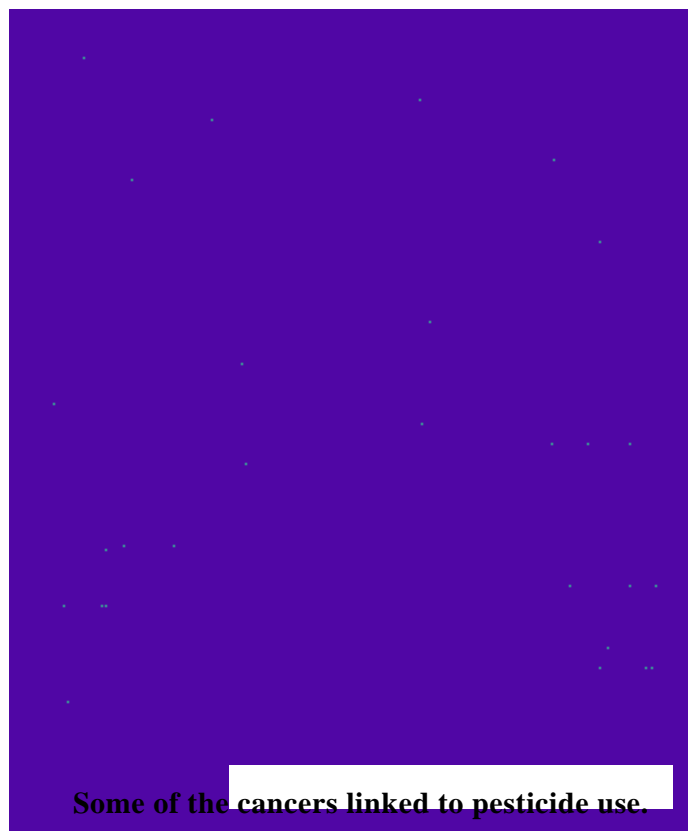
S. No.	Characteristic	N	% age
1.	Age		
	Young (upto 35 years)	42	35.00
	Middle (36 to 50 years)	65	54.17
	Old (51 and above)	13	10.83
2.	Education		
	Illiterate (can't read and write)	20	16.67
	Primary (1-4)	50	41.67
	Middle (5-7)	39	32.50
	High (8-10)	9	7.50
	PUC	2	1.67
	Graduate	0	0.00
3.	Family size		
	Small ( $\leq 4$ )	35	29.17
	Medium (5-7)	59	49.17
	Large ( $\geq 8$ )	26	21.67
	Family type		
	Joint	39	32.50
	Nuclear	81	67.50
4.	Land holding		
	Marginal farmers ( $< 2.5$ acre)	7	5.83
	Small farmers (2.5 to 5 acre)	56	46.67
	Semi Medium farmers (5.01 to 10 acre)	51	42.50
	Medium (10.01 to 25 acre)	4	3.33
	Big ( $> 25$ )	2	1.67
5.	Annual income		
	Low (Mean $-0.425SD$ )	37	30.83
	Medium (Mean $\pm 0.425SD$ )	54	45.00
	High (Mean $+ 0.425SD$ )	29	24.17
	Mean :	49.83	
	SD:	22.77	

*Impact on Human Health:* Globally, among the biggest dangers from farming is the continuous exposure to and the unsafe use of chemicals necessary for agriculture. In India, however, the danger to human health from such environment and pollution related causes are not given their due importance as accidents from farm machinery, with a fatality rate of 22 per 1,00,000 farmers. Fatality apart, chronic exposure to air and waterborne chemicals can have adverse health effects, which sometimes, can be difficult to measure because

of problems in isolating individual chemical effects. (Table 2)

While certain cause and effect relationships are not easy to identify, cumulative effects are likely to be most critical. Cancer risk could be high from nitrate,

Figure 1 : Cancers linked to excessive pesticide and chemicals use in agriculture.



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metals, as well as pesticides; other problems like adverse hormonal functions, liver damage could also take place, as summarized (Figure 1). Moreover, toxic chemicals and pesticides in air, water, and earth enter body tissues and breast milk, through which they are passed on to infants.

Water applied to the field in irrigation either seeps through to underground aquifers, or reappears as 'return flow' and finds its way back to the surface (regeneration); seepages from canals recharge groundwater aquifers; industrial use of water results in effluents; domestic and municipal uses become sewage; and whatever water evaporates comes back to earth as rain or snow. As seepages include pesticides, effluents include pollutants and untreated sewage; they find way into water bodies, which in turn leads to declining biodiversity.

*Policy thrust and Government interventions:* A much-generalized cause of environmental degradation is the failure of the governments to formulate appropriate policies to ensure sustainable land and water use. Such policy failures include price distortions through government- controlled prices, subsidies or taxes which give incorrect price signals, faulty delineation of property rights regimes and other legal structures, government projects which directly cause environmental damage, and weak public institutions. Furthermore, state appropriation of property rights has undermined traditional (often communal) property regimes, as in the case of our forest policy, and has in several cases led to de facto open access and resource degradation.

Table 2. Toxic heavy metals with established health effects

Heavy Metal	Sources of Environ Mental exposure	Minimum Risk level	Chronic exposure Toxicity effects
Lead	Industrial, vehicular emissions, paints and burning of plastics, papers, etc.	Blood lead levels below 10 µg/dl of blood*	Impairment of neurological development, suppression of the haematological system and kidney failure
Mercury	Electronics, plastic waste, pesticides, pharmaceutical and dental waste Below 10 µg/dl of blood*	Oral exposure of 4mg/kg/day**	Gastro-intestinal disorders, respiratory tract irritation, renal failure and neurotoxicity
Cadmium	Electronics, plastics, batteries and contaminated water	Below 1 µg/dl of blood*	Irritation of the lungs and gastrointestinal tract, kidney damage, abnormalities of the skeletal system and cancer of the lungs and prostate µg/dl*: micrograms per decilitre of blood mg/kg**: milligrams per kilogram

µg/dl\*: micrograms per decilitre of blood

mg/kg\*\*: milligrams per kilogram

*Micro planning approach and decentralisation:* The answer to all the miseries does not lie in large, centralized, 'top-down', technology-driven projects but on the local, decentralized, community-based, people-centered alternatives availability and interactions. Problems of scarcity of water, depleted aquifers, declining groundwater tables, and drought proneness have been successfully tackled by water harvesting endeavors in Ralegan Siddhi village in Maharashtra, Sukhomajri in Haryana, and Alwar in Rajasthan. These are not 'small' instances to be dismissed as one-off phenomenon but examples of significant and sustained success achieved in terms of increased water availability and rise in groundwater table.

*Livelihoods encompassing capitals:* Livelihood encompasses physical, natural, social, financial and human capitals. The proponents of decentralization argue that the establishment of local (formal) institutions has the capability to improve people's management and use of common property resources, thereby improving the resource base on which poor people are often disproportionately dependent. It is hoped that through these institutions, participation can better target benefits to the poor through the identification of key stakeholders who are most affected, and can imply an on-going information exchange and discussion through consciousness-raising by shared understanding of problems and a vision for the future that leads to commitment and ownership by the community.

*Traditional water harvesting models:* The new paradigm stresses the involvement of local people in contrast to the top-down paradigm, and tends to dominate management of natural resources at the local level. It has been argued that the emergent paradigm for humans living on and with the earth brings together decentralization, democracy, and diversity. The importance of traditional ways of combating with problems could be important too: here, informal institutions could be involved. For instance, whenever villagers in Karnataka's Bijapur district sense a drought is imminent, they prepare for war with nature. Harbingers travel from place to place and try to bring rain through magic. Rainmaking may not work but the participants at least endeavour to do something in a situation.

## CONCLUSION

*Strategic Review of Agricultural Extension:* Farming systems vary with agro-ecological conditions and no single intervention will work as a magical cure for improving farm productivity. Agricultural extension has the potentiality and is equipped to develop and support the livelihood based on natural resources, especially water resources.

*Properly planned and technically sound agriculture management :* The degree of market integration, choice of crops and cropping systems, use of conservation technologies and use of purchased inputs and their effects on the farming system, are all important in determining the sustainability of particular farming systems.

*Strengthening extension systems:* Revival of agricultural dynamism calls for corrective steps to deal with the near collapse of the extension systems in most states and the decline in agricultural research universities.

*Proper linkage between researcher to farmer field:* Lab-to-land concept should be encouraged and put to practice by providing land-users multidisciplinary technical information and viable land-use options and alternatives identified for various agro-ecological and socio-economic units. Crop combinations and rotations suitable for different agro-ecological regions (as suggested by the ICAR) need to be advocated for better land management.

*RCTs and recommendations of premier research institutions:* There is a need to stay abreast with evolving resource conservation technologies and practices and on analyzing the conditions and principles of sustainable land use. Efficient use of marginal lands needs to be encouraged and areas of untapped potential developed to ensure optimal utilization. For agricultural diversification to be a major element in the agricultural growth strategy, action on several fronts is necessary. Ideally, there should be a shift of land from cereals to non-cereals (increasing both farm incomes and employment) combined with an increase in productivity in cereals to ensure that per capita availability of cereals does not decline.

## REFERENCES

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