Conservation of Water and Fertilizers by Wastewater Irrigation and Associated Problems

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Abstract:

The use of waste waters for irrigation is being highly advocated these days as management proposition for polluted waters as well as to combat the scarcity of irrigation waters particularly in arid and semi-arid regions, and as a source of plant nutrients such as nitrogen and phosphorus. However, an understanding of the quality of irrigation water and its potential negative impacts on crops and soil characteristics is must to avoid problems and to optimize crop production.

The important parameters to be analyzed in irrigation waters are mainly Sodium Adsorption Ratio (SAR), percent sodium (% Na), Total Dissolved Solids (TDS), Residual Sodium Carbonate (RSC), Electrical Conductivity (EC) and chlorides etc. A high SAR value above 9 is not suitable for irrigation, while sodium above 70% can damage most crops. A value of RSC above 2.25 is grossly unsuitable for irrigation.

Many crops are highly sensitive to high salt water irrigation (clover, burnet, beans), while others are moderately (alfalfa, corn, flax, oats, rice, rye sorghum) to highly tolerant (barley, cotton, sugar beet, grasses). The use of wastewaters and high salt containing waters in irrigation should be made with utmost care, with prior evaluation of water and soil quality and proper selection of crops. Sandy soils can tolerate high level of pollution in comparison to fine textured soils

1. Introduction:

The use of waste waters for the purpose of irrigation can be a good proposition for conserving water and fertilizers, and management of polluted water, especially in the arid areas. The wastes from several industries such as sugar, fertilizer, beverages, paper and pulp as well as sewage are rich in fertilizer constituents and can be used for irrigation after proper treatment, where N, P and K still remain in high quantities in the treated waters. The wastewaters can provide moisture and nutrients necessary for crop growth (Oron 1995, Keraita & Drechsel 2004, Scott et al. 2004). Applying these wastewaters to soil can be a good means of recycling the nutrients where they are separated out from the waste by crops and soil and help maintaining the soil fertility without the application of fertilizers. An understanding of the quality of water used for irrigation and its potential negative impacts on crop growth is essential to avoid problems and to optimize production (Gratton 2002). Practical application of variously treated wastewaters can be made on various types of crops as has been given in Table 1. However, a large number of factors can affect the agricultural systems, which are to be given proper attention when the wastewaters are to be used for irrigation. Some of these important factors as outlined by Arceivala (1986) are mainly, water application rates depending upon climate, crop and soil; nutrient requirements of crops and nutrients available in wastewaters and soils; organic load on soil; pathogen transmission (especially in case of sewage); presence of toxic substances and their transmission through the food chain; development of soil salinity; long term effects on soil and plants; pollution of water resources, especially ground waters; and treatment efficiency of soil. The fertilizer contribution by wastewater with different irrigation rates is provided in Table 2. The value of fertilizers added by wastewater can be evaluated by the following equation.

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$$\text{kg/ha} = \frac{\text{Concentration (mg/L)}}{10} \times \text{cm applied}$$

The use of industrial wastes for irrigation may be much more beneficial especially in the arid and semiarid conditions, characterized by relatively poor availability of good quality water. Though, it seems highly promising to use waste waters for agriculture, it is marred by several constraints. Many problems like increase in soil salinity and alkalinity, and changes in soil property and micro flora can emerge during wastewater irrigation (Qadir et al. 2007). High SAR values reduce the permeability of soil. High sodium leads to the alkalinity and develops sodic soils. A high organic loading due to high BOD and COD of wastes cause anaerobic environment in the soil due to decomposition of organic matter. This will affect the root respiration as well as change the micro lora. If the waste waters contain some persistent chemicals like metals and pesticides, they can be accumulated in soil and taken up by the plants, thus, facilitating their entry into food chains. Itai Itai disease, occurred in 1950s in Japan, was caused mainly by the use of cadmium containing irrigation water used for rice. The general limits put forwarded for heavy metals in irrigation water are given in Table 3. Other problem, which may be caused by wastewater irrigation is transmission of waterborne diseases, especially in case of sewage. Vegetable crops should usually be avoided and wastewater irrigation should be stopped about two weeks prior to harvesting of the crops. The farmers or the workers may also be subjected to various skin diseases, hence enough protection in the form of gloves and gumboots should be taken. This will also check the entry of some pathogens through the route of skin. This necessitates a detailed scientific study with regard to the characterization of soils and waste waters before the latter can be used for irrigation.

2. Considerations of Physicochemical Quality of Irrigation Waters:

The effluents intended for exploitation in irrigation usually remain high in BOD, suspended solids, hardness, alkalinity, anions such as chloride and sulphate, monovalent cations such as sodium and potassium, and eutrophying elements like N and P, and certain pollutants like heavy metals and organics. All these substances may prove to be harmful to crops and soils, if present beyond certain limits. The general guidelines to evaluate reclaimed wastewaters for irrigation are depicted in Table 4. The concentration of dissolved salts in the soil solution is directly related to the osmotic pressure on which depends the absorption of water by plants. According to Wilcox (1959), if the excessive salts cause an osmotic pressure of above 6 atmosphere, the plants are unable to absorb water from the soil. An irrigation water containing more than 1500 mg/L of dissolved salts may cause a concern as it will rapidly increase the salinity of soil. Only tolerant crops with high drainage in soil should be selected for high salinity waters. The crop responses to irrigation water with different salinities are given in Table 5. Another parameter for evaluating the salt content of the waters is electrical conductivity (EC). There is a direct correlation between dissolved solids and EC. A list of certain plants sensitive and tolerant to various levels of EC values is given in Table 6. Soil structure is considerably affected in the long run by sodium content of the irrigation water. High sodium in effluents replaces calcium and magnesium from the soil through exchange reactions resulting in the increase of soil sodium. The excess sodium breaks down the clays by deflocculation of soil particles reducing soil porosity and infiltration. The soil structure is ultimately impaired, and the soil becomes a puddle when wet and hard when dry. High quantities of sodium may also be damaging to sensitive crops because of its phytotoxicity. A list of plants sensitive and tolerant to various levels of exchangeable sodium is given in Table 7.

The sodium hazard of the irrigation waters is usually dependent upon the sodium concentration in relation to the concentration of calcium and magnesium. The hazards of sodium can be evaluated by the following two parameters: Sodium adsorption ratio (SAR): Percent sodium: For calculation of these two parameters the concentration of the ions is taken in the units of m Eq/L.

Suitability of water for irrigation with different values of SAR is given in Table 8. A water up to SAR of 10 can be considered suitable for the crops. Above 26, the water is grossly unsuitable for

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irrigation. A water with 50-60% sodium can be considered good for irrigation. The values of % Na above 70 are considered quite dangerous. The sodium hazard to the crops can also increase significantly with rise in bicarbonate concentration because of the tendency of calcium and magnesium to be precipitated as their carbonates in concentrated soil solution. This increases the level of sodium in soil solution in comparison to the level of Ca and Mg, thus, shifting the SAR value on the higher side. The SAR value in the soil solution is called adjusted SAR. The bicarbonate value in irrigation waters are usually represented as "Residual Sodium Carbonate" (RSC), which is calculated as:

RSC = (Carbonate + bicarbonate) - (Ca + Mg)

A value of RSC below 1.25 is considered quite safe for irrigation. A value above 2.25 is unsuitable for irrigation.

3. Considerations of soil characteristics :

Some of the prime important factors on which the scientific utilization of waste waters for irrigation depends are climate and soil characteristics. The climate will decide the rate of evapotranspiration, which greatly affects the salt buildup in soils. The soil characteristics such as texture will define the properties of infiltration, water holding capacity and porosity etc., which are important properties those decide the fate of water and chemicals in soils. The soil properties suitable for wastewater irrigation are provided in Table 9. The major chemical reactions of significance in soils are ion exchange, adsorption, precipitation and complexion. These are dependent upon the solute concentration, exchangeable cations, cation exchange capacity, pH, available P, total N, organic C, oxidation reduction potential and mineral composition. Based on the physical and chemical properties of soils, soils can be grouped as those with high production potential, normal/average production potential and poor production potential as given in Table 10.

4. Conclusion:

Though, the usefulness of wastewater irrigation has been highly advocated as a means of recycling of waste waters and nutrients present therein, the irrigation cannot be carried out indiscriminately. For proper use of the wastewaters in irrigation, due consideration should be given to climate and soil properties as well as chemical characteristics of the wastewaters. For this, a complete characterization of the wastewaters and soils in the field is necessary. Several wastewaters, especially the municipal sewage and hospital wastes, contain pathogenic organisms, warranting due care with regard to the public health. It is always better to give some degree of treatment to the waste waters for using them for irrigation, to prevent the soil deterioration in the long run.

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Table 1: Suitable crops for irrigation with variously treated and raw wastewater

Extent of treatment	**Choice of crops**
Secondary treatment followed by chlorination	All crops
Secondary treatment without chlorination	Grain crops and vegetables not eaten raw
Primary treatment	Grain crops and vegetables not eaten raw; Fodder, fibre and orchard crops
Oxidized and disinfected effluent	Pasture and milting cattle, lawn grass in public gardens and landscape irrigation,
5. Raw wastewater	May be used only for forest and avenue plants with utmost care to prevent contamination, however, all attempts should be made to develop a pretreatment method

Table 2: Magnitude of addition of nutrients to soil in wastewater irrigation.

Nutrient	Concentration (mg/L)	Fertilizer contribution (kg/ha)	
		Irrigation (3000m^3/ha)	Irrigation (5000m^3/ha)
Nitrogen	16-62	48-186	80-310
Phosphorus	4-24	12-72	20-120
Potassium	2-69	6-207	10-345
Calcium	18-208	54-624	90-1040
Magnesium	9-110	27-330	45-550
Sodium	27-182	81-546	135-910

Note: Data based on Qadir et al. (2010) and Lazarova & Bahri (2005).

Table 3: General limits for trace elements in water used continuously for crop irrigation

Trace Elements	Limits (mg/L)
Aluminium	1.0
Arsenic	1.0
Boron	0.75
Cadmium	0.005
Chromium	5.0
Cobalt	0.2
Copper	0.2
Lead	5.0
Manganese	2.0
Molybdenum	0.005
Nickel	0.5
Selenium	0.05
Zinc	5.0

Table 4: General guidelines to evaluate reclaimed wastewaters for irrigation.

S. No	Parameters	Desired value/range	Values causing concern	IS: 3301 – 1977
1.	pH	6.5 – 8.2	6.5 – 8.2	5.5 – 9.0
2.	TDS (mg/L)	120 - 700	1500	2100
3.	E.C. mmhos/cm	0.2 – 1.0	1.5	3
4.	Chlorides (mg/L)	350	700	600
5.	Sulphates (mg/L)	500	1000	1000
6.	Boron (mg/L)	0.5	2.0	2.0
7.	Oil and grease (mg/L)	10	100	10
8.	BOD (mg/L)	20	200	300
9.	Suspended solids (mg/L)	5	100	-
10.	Adj SAR	6	9	-
11.	% Na	60	60-70	60
12	RSC, mg/L	1.25	2.5	-

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Table 5 : Crop responses for irrigation water with different salinity levels.

	Crop Response	TDS (mg/L)	EC, mmhos/cm
1.	Water for which no detrimental effects will usually be noticed	Less than 500	Less than 0.75
2.	Water which can have detrimental effects on sensitive crops	500-1000	0.75-1.50
3.	Water that may have adverse effects on many crops	1000-2000	1.5-3.00
4.	Water that can be used only for salt tolerant plants	2000-5000	7.00-7.50

Table 6: Consideration of soil EC for suitability of crop plants.

Tolerant (10,000 - 18,000 µmho)	**Semi-tolerant (4000 - 12000 µmho)**	**Sensitive (2000 - 4000 µmho)**
Barley	Alfalfa	Clover
Bermuda grass	Corn	Burnet
	Flax	Field beans
Canada wild rye	Oats	Meadow foxtail
Cotton	Orchard grass	
Rape	Rice	
Sugar beet	Rye	
Rescue grass	Sorghum	
Rhodes grass	Sudan grass	

Table 7: Tolerance of various crops to exchangeable sodium percentage (ESP) under non saline conditions.

Tolerance to ESP	**Crop**
Extremely sensitive (ESP - 2-10)	Deciduous fruits
	Nuts
	Citrus
	Avocado
Sensitive (ESP 10 - 20)	Beans
Moderately tolerant (ESP - 20-40)	Clover
	Oats
	Tall fescue
	Rice
	Dallis grass
Tolerant (ESP - 40 - 60)	Wheat
	Cotton
	Alfalfa
	Barley
	Tomatoes
	Beet
Most tolerant (ESP = > 60	Crested and Fairway wheat grass
	Rhodes grass

Table 8: Suitability of water for irrigation with different values of Sodium Absorption Ratio (SAR)

SAR	Suitability for irrigation
0-10	Suitable for all types of crop and all types of soils except for those crops which are highly sensitive to sodium
10-18	Suitable for coarse textured or organic soil with good permeability. Relatively unsuitable in fine textured soil
18-26	Harmful for almost all types of soils. Require good drainage, high leaching and gypsum addition
>26	Unsuitable for irrigation

Table 9: Soils suitable for wastewater irrigation

S. No.	**Soil property**	**Nature**
1	Depth of soil profile	More than 60 cm
2	Texture and structure	1. Fine textured, well structured (crumb) 2. Coarse textured, well structured
3	Infiltration rate cm/hr	0.5 - 15.0
4	Subsurface permeability	Exceeds or equals infiltration rate

Table 10: Guidelines for soil evaluation.

Soil quality parameters	Graduation in order of production potential based on specific values/range		
	Soils with high production potential	Soils with Normal/ Average production potential	Soils with poor production potential
	Grade A	Grade B	Grade C
Physical properties			
Soil depth (m)	1.0	0.5 - 1.0	0.5
Soil texture	Loamy	Sandy loams/clay loams to loamy sand	Silty clay sandy and clayey
Infiltration rate, mm/hr	12.5 - 25.0	2.5 - 12.5 or 25-250	2.5 or 250
Chemical properties			
pH (saturation extract)	6.5 - 8.3	5.5 - 6.5 or 8.4 - 9.0	5.5 or 9.0
CEC (meq/100g)	30	10 - 30	10
ESP	5.0	5 - 15	15
Available P, kg/ha in 17 cm/plow layer	40 - 60	20 - 40	20
Available N, kg/ha in 17 cm plow layer	200 - 300	100 - 200	100
Organic matter (% dry wt. basis)	More than 4	2 to 4	2

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Modern Trends in Rural Management and Development: A Paradigm Shift

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Abstract:

Organic Farming and Micro Finance are two such modern trends in the field of Rural Management and Development. These fields are contributing for the growth of the country to become the powerful nation in the world. The young population of India in the next 10 years is one of the key factor in this development. The educational institutes are required to upgrade the skills of this young generation to equip them for the national development. NAARM (National Academy of Agricultural Research Management), Hyderabad have started special PG diploma in Rural Management. I was one of the participant to design the curriculum of this course.

Indian Microfinance Sector has witnessed phenomenal growth over the past 15 years. Number of Institutions providing microfinance services have gone up from a few numbers to several hundreds. The quantum of credit made available to the poor and financially excluded clients have gone past Rs.30000 crore and number of clients benefitted crossed 30 million as of March 2014. Many of the big companies in the country have started focusing on this sector.

Keywords: *Micro finance, NAARM, Organic Farming*

The Government has created conducive policy framework for Micro finance Institutions (MFIs) to operate in the country.

1. Definitions:

1.1 Microfinance:

Micro Finance refers to provision of thrift, credit, and other financial services and products of very small amounts to the poor in rural, semi urban or urban areas, for enabling them to raise their income levels and improve living standards.

1.2 MFIs:

MFIs are those organizations, other than banks, providing micro financial services.

1.3 Legal Form:

Incorporation of MFIs under different acts of the country determines the legal form. The common legal forms include Society, Trust, Cooperative, Section 25 Company, Non-Banking Finance Company (NBFC). From 2010 onwards RBI has introduced new form of NBFC for doing Micro Finance work. They are registered under NBFC – MFI category.

1. Summary of MFIs:

2.1 No. of MFIs across MFI size (Client Base):

Size Client Outreach	No. f o MFIs
Tier I > 2.5 Lakh	**23**
Tier II 0.5 - 2.5 Lakh	**40**
Tier III < 0.5 Lakh	**204**
Total	**267**

2.2 No. of MFIs across Legal Form:

Legal Form	**No. fo MFIs**
Society	110
Trust	21
Section 25 Company	26
Cooperative	18
Local Area Bank	1
NBFC	91
Total	267

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Micro finance has become one of the universally accepted tools for poverty alleviation. It is an emerging field. It is also a specialized field with intensive human resource requirement. Indian micro finance sector employs more than one lakh personnel as part of its workforce. The type of personnel required for micro finance institutions is unique since the clientele served are different - the poor, vulnerable, and illiterate and mostly women. Effective micro finance service delivery calls for blend of expertise in finance and social work.

Most of the micro finance institutions in India have evolved from NGO- mould and embraced financial intermediation for the first time. They have challenges in talent pool management for achieving organizational objectives-reaching the unreached through small value transactions in remote locations. The highest staff turnover is one such challenge faced by them.

3 Talent management is a term used to describe a set of processes and practices that an organization uses to ensure that the right person is in the right job in the context of the goals of the organization. It also includes the approach and processes developed to manage the careers of employees and ensure that successors are developed for all key positions as well as for managerial positions. The objective of most talent management systems is three-fold:

* Ensure that employees are aware of the kinds of careers that they can look forward to in the organization
* Developing leaders and specialists within the organization to fill current and future positions
* Retention of talent within the organization

4 Segmentation of Target Market

Micro finance Products & services	**Primary Market**	**Secondary Market**	**Tertiary Market**
Micro Credit	Financial active women customers	Commercial banks FIs, Donor Agencies Other Institutional funder with social objective	Study teams, NGO's
Micro Insurance	Customer, spouses, & other family borrowers	Insurance Companies	MFIs
Micro Saving & Deposit Services	Borrowers and non - borrowers	Commercial Banks	Rating agencies
Micro Pensions	Borrowers and non - borrowers	Government, Commercial Banks	Network agencies,
Money Transfer Services	Borrowers	Commercial Banks	Regulators,
Business Development Services	Borrowers families	Corporate Companies, Govt., NGO's CB Organisation	Consultancy firms,
Sub -Sector based livelihood interventions	Borrowers families	Corporate Companies, Govt., NGO's CB Organisation	CB organisations Media,
Non -financial development services	Borrowers and non - borrowers	Local reputed NGO's donor agencies	Educational institutions & Students

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5. An analysis of micro finance industry in India:

Today, micro finance in India is part of larger financial framework and MFIs are emerging as social business within this framework, catering to an untapped market segment while creating value for their shareholders. MFIs have emerged as the most important channel in Indian micro finance supply with a market share of almost 47% growing rapidly compared to the SHG – Bank linkage Channel. In the last five years, Indian MFIs have demonstrated impressive growth rates compelling financial performances and increasing efficiencies, exceptionally well when benchmarked against their Asian counterparts. With very high growth rates many MFI have achieved 75-100% portfolio growth annually. MFIs are reaching out to their clients faster with higher loan sizes. The decreasing rates charged to clients and declining cost ratios along with rising competition is making room for competitive pricing in the Indian micro finance space. In addition, such a scenario triggers innovative in financial instruments, delivery channels and business partnerships that overcome the legal and market –related constraints in reaching out to the poor.

Exceptional business leaders, benevolent donors, risk taking bankers, and forward thinking equity investors have played key roles in this growth story. Finance a key driver in making the above growth happen continues to be major determinant of the future directions of Indian micro finance. In addition progressive regulation, innovative business strategies and investment in institutional capacities will have roles to play in promoting this growth .Given their past performance and key drivers, the Indian MFIs are expected to build a portfolio of USD 6.27 billion (INR 251 billion) over an active borrower base of 68.7 million by 2016 in the most likely growth scenario . To support this growth ,both large and small MFIs will require cumulative equity capital of USD 535 (INR 21.7 million) and debt of USD 5.46 billion (INR 221 billion).

6. Sector and Macro Environment Analysis:

The micro finance environment in India is undergoing rapid transformation. This is because of changes in government regulation and economic policies forces of globalization and competition. Many MFIs have started utilizing the opportunities that are emerging because of the changing market needs. The changing environment constantly post threat and opportunities to the market players, understanding them and adapting according to the environment is important for survival. In this exercise MFIs are assessed and analyzed by Rating Agencies. Some of these rating agencies are CARE, CRISIL, ICRA, M-CRIL, SMERA, etc.

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7. PEST Analysis: The acronym stands for the political, Economic, social and Technological issues that could affect the strategic development of a business.

Factor	Events/ Issues	Opportunity/ Threats	Probability/significance	Impacton strategic Plan
Political	Political influence	Threat	Low frequency	High impact
	Business pressure	Threat	Low frequency	High impact
	Factions with different interests	Threat	Low frequency	High impact
	Income Tax Office specially to a society	Threat	Low frequency	High impact
	Less regulated legal form of IRCED	Threat / Opportunity	High Frequency	High impact
Economic	Growth of national/regional economy	Opportunity/Threat	High Frequency	High impact
	Consolidation, mergers and acquisitions	Opportunity/Threat	Low frequency	High impact
Social	Complex Religious /caste factions	Threat	Low frequency	High impact
	Regional bias	Threat	Low frequency	High impact
Technological	Innovations in MIS	Opportunity	High Frequency	High impact

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8. Demand

Assuming the entire poor population in India a potential micro finance clients, the market size for micro finance in India appears to be in the range of 57.9 to 77.3 million clients translating in to an annual credit demand of USD 5.7 to 19.1 billion 9 INR 230 to 773 billion) .

If we assume the economically active low income occupational segments such as the small and marginal farmers, landless agricultural laborers, and micro entrepreneurs, are micro finance clients as well as, then the annual credit demand goes further up to an estimated 245.7 million individuals and USD 51.4 million (INR 2.1 trillion) in annual lending requirements.

Apart from micro –credit, there is a great demand for micro insurance, remittances, micro pensions, etc. Now Micro pension i.e. PRAN has emerged to address the poor people or people from unorganized sector's need for getting pension.

Low-income segments save for insurance against emergencies social events, investment and future consumption needs. One of their primary needs is access to safe, convenient mechanisms to hold their savings therefore, form and integral part of the micro finance services sought by such segments. Considering the total number of households below poverty line (57.9 million), the potential annual savings base would be around USD 3 million (INR 12170 crores).

Micro credit customer's incomes are both low and variable. Such client segments need insurance services for assets including crops, livestock and houses. In addition, access to such services reduces the need to access expensive credit from informal sources in the event of contingencies such as illness and death. The total annual demand for micro insurance could be anywhere between USD 500 million to USD 2.18 million (INR 20.2 to 88.3 billion). On the basis of premium of INR 1 per client for a total client base of 57.9 to 245.7 million.

9. Supply

Reaching out to India's vast low income population with flexible financial services presents formidable challenge.

However, the supply side is weak. The Indian MFIs collectively serving to only 10% of the population. The supply is approximately USD 5 billion (INR 200 billion) against the demand of USD 51.4 billion (INR trillion).

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In Search of New Agricultural Marketing Model

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Reforms in Agriculture Marketing
* 2003 – amendments for terminal market
* 2005- Private Market, Direct Marketing, Farmer Consumer Market, Single License to Trader, Cadre of APMC Secretary, Special Commodity Market, Regional/Divisional APMC
* 2006- Contract Farming
* 2007- Rules of the amendments prepared and implementation of amended act started

Achievements after reforms
* Direct marketing licenses – 41
* Private market licenses – 3
* Single license to trader – 3
* Important licenses

  Aditya Birla, Pantaloons, Premium Farm Fresh, Metro-Cash, Mahindra & Mahindra, National Spot Exchange, NBHC, ITC, Cargill, Reliance Retail, Radhakrishna Foodlands

Restructuring of Indian Agricultural Marketing as Envisaged by WTO Provisions
* India's Agriculture Potential
* History of Agricultural Marketing
* Growth of Agricultural Markets in India
* Distribution of Agri-Markets in India

Subsidies and Suicides
1. Subsidies over the Years
2. Factors of Structural Adjustments in India
3. Pre & Post WTO Scenario

A. Agricultural Growth Rate
B. Imports and Domestic Prices
C. GDP
D. Example of Oilseeds/Cotton and Vegetables

West has cheated the developing countries
1. Market access
2. Domestic support
3. Export subsidies

Measures to gear up
1. Rural godowns
2. Market information network
3. Market research
4. Market reforms

* Connect markets by road and computers
* Empower farmer to play his role in production and marketing
* Make markets functional
* Make market economy vibrant
* Remunerative farm returns as sole objective - supported by policies

Points of discussions
1. In all the countries co-operatives play an important role in supporting the community at the time of disaster and at any crises?
2. The Govt. intervention in Japan during the 2011 disaster was slow whereas co-operatives provided more organised and faster services.
3. The ICA always mobilised the resources and helped members all over the world during disaster.
4. Emergency relief is important but post disaster rehabilitation is crucial
5. Disasters cannot be prevented but preparedness lowers the risk
6. Un and governments realise the importance of co-operatives in community mobilisation and coordination
7. Net working and coordination with government and other civil societies for input and support is very important for cooperatives.
8. The manmade disasters like Fukushima Nuclear Power Plant leakage is more dangerous and having longer impacts. The manmade disasters should also be included in the draft resolution.
9. The ICA mobilises resources but a system should be

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put in place for quick response.
10. Establish procedure for disaster management and prepare the community through communication and education
11. The ICA and un will take forward the discussion for future partnership.
12. Need for a separate Theory of IT
a. Political and legal differences
b. Cultural and language differences
c. Economic differences
d. Differences in the currency units
e. Differences in the marketing infrastructure, trade restrictions, high transport costs and
f. Differences in trade practices.

China's Model of Modern Agricultural Industry

* Outstanding corporations prefer to spend great efforts in seeking the current demand, potential need and new requirement of the industry.
* Model of modern agricultural industry chain is different from traditional agricultural industry chain. It is a business model core as products, aim as food safety, construction as consumers' demand and maximization of economic benefit.
* Competition of modern agriculture is more and more fierce. In the meantime, merger and capital operation among large modern agriculture corporations are ever frequent. And the outstanding modern agriculture corporations in china are placing more importance on the research of the industry market, especially the depth research of industry development environment and customers.
* Forward business intelligence co., ltd. Provide prudent investment solution to agricultural dilemma basing on agricultural industry chain. Basing on the market data of modern agriculture market, which tracked and collected by forward in long-term, and applying the international scientific analysis model.
* Comprehensive and detailed data about nonwoven industry in current 5 years is contained.
* Maintain the market trend and industry dev-elopment comprehensively and accurately.
* It gives a prudent analysis and forecast of modern agriculture according to the industry development track and forward's years of practical experience.
* learns about the latest development trend, grab market opportunities, and make correct marketing decision and explicit corporations' development trend for all modern agriculture corporations, R&D institutes, VC/PE capital.

Aspects of development

* The report mainly contains the following aspects:
* Development background of modern agriculture;
* Construction benefit and limitation of agricultural industry chain;
* Market targets of modern agriculture;
* Operation of modern agriculture business;
* Business model of the whole industrial chain;
* Investment suggestions to the industry chains;
* Capital and VC/PE capital of the industry;
* Development trend forecast and planning of modern agriculture industry chain.

Thai Model

* First, success is a result of directed policy where outcomes are jointly determined by the synergy of government actions and by the fruit of private sector initiatives.
* Thailand expanded rubber and later, oil palm following the experience of Malaysia. It is a late comer in the sugar industry but it is now one of the worlds most efficient.
* Third, value adding creates a network of agro-based manufacturing industries which are job-creating.
* Fourth, stable policies supported by continuity in programs and competent bureaucracy characterized the Thai system.
* Fifth, industry champions are critical to execute stakeholder-driven road maps.
* A dynamic private sector made Thai's success in agriculture possible. Applying the basic principle of subsidiarity, the Thai government provided the right business climate and concentrated on roads, irrigation, crop breeding and other support services.

Agri-Food Exports: Why Thailand is a Model of Diversification by Rolando T. Dy Philippine Daily Inquirer (referred on 7:54 pm | Sunday, January 26th, 2014)

Steps taken by Agricultural Marketing Dept.

* Direct supply of agriculture produce by farmer to consumers and consumers' societies.
* Purchasing from farmer by small trader and selling directly to consumers.
• Shetkari Bazaar to increase direct trade between producer and consumer.

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Rural Development through Rural Management: A Paradigm Shift

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Abstract

Rural development must focus on balanced development of both physical and social infrastructure, which, in turn, will result in human development. In India, rural development is the sine qua non of national development, due to the predominantly agrarian nature of the country's economy. If rural development is aim for our national priorities, the rural management should be considered as appropriate technique to achieve the goal. This paper aims at taking overview of rural development with rural management perspective. It also discusses the basic issues related to rural development such as rural urban divide, Ecological Degradation and Social and Economic Inequalities and Alienation. It also focuses on the strategies to be adopted by rural institutions for sustainable rural development.

Key words: *Rural Development, Rural Management, India, Management Perspective. JEL Classification:N75, O18, R10.*

1. Introduction:

Rural development must focus on balanced development of both physical and social infrastructure, which, in turn, will result in human development. In India, rural development is the sine qua non of national development, due to the predominantly agrarian nature of the country's economy. According to Singh (2000) 'rural development implies that there is a sustained improvement in the quality of life of rural people and a sustainable increase in access to adequate quantities of basic necessities of life such as food, clothes, shelter, basic literacy, and security of life and property'. If rural development is aim for our national priorities, the rural management should be considered as appropriate technique to achieve the goal. Rural management is the operation of the rural sector as a system which is concerned with the transformation of the rural society. In the process of rural development, public bureaucracy, NGOs, credit institutions, corporates, Panchayat Raj Institutions, Cooperatives etc. has significant role to play. To some extent they have played their role in rural development. However, it is not adequate when the world is preparing for dazzling changes is science, technology, agriculture, commerce, and industry, resulting in a 'high-tech multi-revolution' and globalization of economic activities. This paper aims at taking overview of rural development with rural management perspective. It also discusses the basic issues related to rural development such as rural urban divide, Ecological Degradation and Social and Economic Inequalities and Alienation. It also focuses on the strategies to be adopted by rural institutions for sustainable rural development.

The following questions should be addressed to formulate appropriate strategies for rural development:

1. What kind of a society do we want to live in?
2. What is the meaning of modernization to us?
3. Can we put forward any social preconditions for economic change?
4. How do we make management responsive to the fast changing needs of our society?

2. The Basic Issues:

All the following three issues are closely interrelated and form the basic framework of rural management:

1. Rural Urban Divide

2. Ecological Degradation
3. Social and Economic Inequalities and Alienation

2.1 Rural Urban Divide:It is a division of country with sprawling cities on one hand and gaping countryside on the other. According to Toffler (1981), the second wave consisting of industrialization moved people into the cities for production and now we shall have to move the factories and workforce back into the countryside. Many nations, who could never really switch from the 17th century agrarian economy, can now integrate new manufacturing techniques into their society without moving the entire population. We are observing today the emergence of new values and beliefs, new geo-political relationships, new life-styles and new modes of management practices. It requires a wholly new set of ideas, policies and management practices.

In India, there are some success stories like 'Amul', 'Warana', 'Gokul' and so on where efforts have been made to reconcile the rural with the urban, to producer with the consumer, to develop what Toffler called 'a prosumer society'.

Many of our development programmes go counter to the way of life of people. The situation is worse in the case of rural poor. More important question is who are these rural poor? Whenever we discuss about rural development some issues of rural industries are taken care, few issues of farmers are addressed, however, the problems of people are unanswered who have no even any resources. For instance, the landless labourers are always deprived. The people living at the margins of subsistence are excluded from the process of development.

2.2 Ecological Degradation:Half of India's land mass of approximately 329 million hectors is degraded, and its productivity is far below its potential. If deforestation continues, at this present rate, there will be hardly any forests left at the turn of the century. Agriculture would also be seriously affected, such indiscriminate exploitation of non-renewable resources has threatened the life-supporting system of the earth.

The variety of pollution is degrading whole environment of country-side since we are benefiting by industrialization with environmental cost of rural people. Though, new opportunities came to rural areas, rural people have continued to survive under difficult circumstances. Commoner (1995) argues that the fate of the eco-system is closely related to the nature of the system or production, and that it is possible to reconcile eco-conservations with economic growth, with appropriate changes in production technology. This will result in both economic growth and environmental improvement.

He further points out that a series of natural products have been displaced by petro-chemical products. The key to the new transformation is social governance of the choice of production technologies and that there are immediate opportunities for improving the efficiency of the economic system by introducing ecologically sound production technologies.

We can minimize ecological degradation by some of the following measures:

1. Use of alternative sources of energy and renewable sources like solar energy,
2. Appropriate agriculture technologies like use of natural method of pest control
3. Proper land and water use
4. Development of large tracts of wasteland

The problems like population, deforestation, pollution and urbanization are adversely affecting rural ecology and quality of life. They need to be tackled by managerial decisions and pro-people and sound policies.

2.3 Social and Economic Inequalities and Alienation: Reaching out to the poor in a complex society like India where caste, class and religion dominate the socio-economic life is a challenge for rural development. Durant & Durant (1968) say that 'freedom and equality are sworn and everlasting enemies and when one prevails the other dies. Leave man free and the natural inequalities will multiply, almost geometrically. To check the growth of inequality, liberty must be sacrificed. Even when repressed inequality grows'. The dilemma, in reaching out to the poor therefore, is how to move forward towards equality without doing violence to liberty. This is an extremely

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difficult and challenging task, especially in our vast and complex rural hinterland.The inclusive policies for rural and especially for rural poor are needed to be formulated intervened considerably. The consistent efforts for the inhalation of caste system are required on national level.

3. Challenges before Rural Development:

1. Very large segment of agriculture sector remained inefficient with low levels of productivity and globally non-competitive.
2. Disguised Employment in agriculture
3. Skills-mismatch of rural youth
4. All developing countries (like India) are either not organized at all or are poorly organized. It is considerable as 'there exists a positive correlation between the extent to which a nation is organized and the level of its development' (Singh, 2000).
5. Inadequate infrastructure.
6. Inadequacy of reaching government programmes.

4. Government Initiatives:

The government has taken various initiatives for rural development since the attainment of independence. However, focus of rural development is inadequate to achieve the goal. The government has implemented some rural development programmes such as Integrated Rural Development Programme, Employment Assurance Scheme, Food for work Programme, Rural Housing, Social Security Programme, Land Reforms, Drought Prone Area Programme etc.

5. Cooperative Movement and Rural Development:

Cooperative institutions have played key role in rural development in India. Cooperative sugar factories, cooperative spinning mills, cooperative dairies, cooperative consumer societies, cooperative credit societies etc. are backbone of rural economy. To some extent, an employment has been generated by these cooperative institutions for rural people. There is significant positive impact of cooperative movement on rural development in some territories. However, it is not succeeded to reach to the rural poor. Still there is potential that cooperative institutions have to contribute all constituents of rural development. 'Warana' is very good example of diversified cooperatives by which the rural development of the vicinity is experienced.

6. Rural Industrialization:

Rural industrialization has taken place through village and cottage industries, agro-based industries, food processing industries, agri-businesses etc.

7. Rural Market: An Attraction:

Indian rural market is very good opportunities to business houses. As the income level of household is increasing, they are aspiring for additional goods rather than basic needs. The corporate entities have implemented strategies to grab this big market for e.g. many products are sold in small sachet, distribution channels are changed. In some cases, SHGs are working as intermediaries for selling FMCGs.

8. Rural Management Perspective:

Rural management is the operation of the rural sector as a system which is concerned with the transformation of the rural society. The future of world will depend heavily on 'the knowledge insight, foresight and competence of the decision-makers of today, and especially of the decision-makers in our institutions, that is, our executives' (Drucker, 1987). Highlighting the role of management in social and economic development, Drucker once remarked, "....there are no 'underdeveloped' countries. There are only 'under-managed' ones" (quoted in Mitter 1987). The crucial role that management can play in accelerating the pace of rural development. A strategy for managing rural development organizations can be outlined. There is crying need for professionalizing the management of rural organizations so as to make them competent to cater to the needs of local rural people but with understanding global scenario.

9. Conclusion:

A rural development organizations will need to be people-centered, if not owned and controlled by them. It should have good leadership and management accountable to its stakeholders, and should be sensitive and responsive to the needs of its stakeholders and to changes in its internal and

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external environments.

If there is an urgent need to modernize, raise productivity, improve quality, reduce costs and face competition boldly to give ultimately the consumer and society a better tomorrow, serious consideration of management issues in rural development is inevitable. Unless and until overall rural development is achieved, it is not possible to translate our constitutional obligations into a reality on the rural social canvas.

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Water Resources – An Overview from Management Perspective

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To overcome the dilemma situation of shrinking of water resources contrary to abundant availability of rainfall, Central government has shifted the focus on Water Management aspects. Planning Commission (2001:5) reported that, Land degradation equally affects the quantity and quality of water. Forest denudation affects hydrological cycle .unscientific land use leads to the unsustainable exploitation of the aquifers, Recurring droughts, floods falling ground water table shortage of the drinking water in rural and urban areas forcefully reminded us that we will face graver crisis in future unless we begin prudent management of our watersheds and water resources. Planning Commission also expects, that state government has to launch a national campaign for integrated watershed management through vegetative means and water conservation techniques with active participation of user Groups. Hence land, water and vegetation care leading to MORE CROP PER DROP is vital for safeguarding both food and livelihood security.

On this background several successful stories have been rose in various parts of country and in most of projects watershed management play crucial role. Sreedevi(2006, 2008) and Pathak (2007),Reported the some tangible outcomes of the watershed projects. In the developed watersheds with concerted efforts to manage rainwater, the groundwater availability is improved not only in the watershed, but the downstream areas also benefited with increased groundwater recharge. In Post DPAP very positive outcomes recorded in the country but long term impact have not been observed. Along with the increased surface and groundwater availability and concomitant private investments also substantially increased in the developed watersheds, resulting in the increased incomes as well as improved livelihoods. Most of the projects in DPAP have not generated the sustainable benefits because of post care of watershed treatments.

Shreedavi (2003,2006), Reported that, Various studies have been pointed out that "Increased water availability also had a positive impact in improving welfare for the women, reduced drudgery, and protected the environment. In few well-managed watersheds, the productivity per unit of land and water increased substantially" In Maharashtra such case studies have been recorded in the Hiware Bazar in Ahmednagar block, Ralegansiddhi in Parner block and Darewadi village in Sangamner block. The reverse migration due to watershed projects has been observed in the Gavadewadi village in Maval block of Pune district.

Pawar C.B. (2009) reported important observation during the study of successful Watershed Management at Hiware Bazar village in Ahmenagar district of Maharashtra. In the Hiware Bazar village the fodder availability is 400 metric tons (mt) increased up-to 6000 mt after watershed project, which in turn responsible to generate the milk of 4500 liters improved the socio-economic conditions of the village by generating currency of US 2411 dollars per day.

Pawar andPatil (2012) recorded the successful case of village Kadwanchi of Jalana district, of Maharashtra (Under Indo –German Watershed Development Program (IGWDP), the watershed activities have been carried out.) Watershed program responsible for Change in land use which is spelled by increase in area under cultivation to 111%, seasonally irrigated two crops to 897 ha, perennial irrigation to 190%, vegetables 240%, decrease in fallow lands by 58%, increase in use of farm implements and 294 micro-irrigation

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sets are in use Two fold increase in crossbred cows and three-fold decrease in indigenous cows is observed due to increase in fodder availability by 1.5 times. Agriculture has shown a new avenue to the people. Area under coarse cereals is reduced to around half and new crops are introduced like horticulture, ginger, etc. The crop yield for pearl millet and grams is increased by 150% while area under cotton & wheat is increased from 199 to 347 and 28 to 99 hectare respectively. Area under horticulture is increased from 3 hectare to 198 hectare. The distress migrations have been fall at zero as a result of regular employment generation of four million. Incomes of per family have been shifted to US 54 dollors to US 286 dollors in post conditions of watersheds.

Overall assessment of the country in the DPAP area where watershed program have been completed and overall its impact in the country have been summarized in the Report of the planning commission the year 2001, which claimed that "It has been experienced that in successful watersheds when the availability of the water increased, peoples changed their cropping pattern from less requiring to more water requiring cropping sequences. This has resulted in scarcity of the water in the other areas of the watersheds and has affected overall production.Therefore as far as possible; cultivation of the high water extracting crops should be avoided in the watersheds, Choice must given to crops solely dependent on rainfall. Besides, efforts should be made to enhance the water use efficiency".(Planning Commission :2001 :Para 4.6.3).

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