Developing Rainfed Agro-entrepreneurship Network: Need for Delineation of Rainfed Agroeconomic Zones

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Rainfed Agriculture

- Any region which has less than 30% irrigated area through major/ minor/ groundwater irrigation is considered to be as rainfed and the agriculture practiced is totally rain dependent is “Rainfed Agriculture”

<table>
<thead>
<tr>
<th>Geographical area</th>
<th>328.7 m.ha</th>
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<tbody>
<tr>
<td>Net cultivated area</td>
<td>161.8 m.ha</td>
</tr>
<tr>
<td>Net Rainfed area</td>
<td>111.7 m.ha</td>
</tr>
<tr>
<td>Net Irrigated area</td>
<td>50.1 m.ha</td>
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CRIDA, 2002
Rainfed Agriculture covers all the climates, dominant soil types and several annual/perennial crops; thus encompasses a range of agro-eco-regions.

Contribution to food production 44%

Supports 40% of population and 2/3 of livestock.

A wide agro-ecological variation results in multiplicity of cropping systems.

- Arid land – 51 m.ha
- Semi-arid land – 123 m.ha
- Dry Sub-humid land – 54 m.ha
- Moist sub-humid land – 61 m.ha

Nalokonda watershed, Anantapur
NATP-MMLUP Final Report, 2005
Crop based Production Systems

- Net cultivated area 142 m ha
- Net rainfed area 96 m ha
- Contribution to food production 44%
- Supports 40% of population

Predominant Rainfed Crops

- Rice 46%
- Groundnut 80%
- Soybean 97%
- Rapeseed mustard 36%
- Sunflower 76%
- Safflower 99%
- Sesame 96%
- Linseed 97%
- Castor 96%
- Pigeonpea 96%
- Chickpea 78%
- Blackgram 94%
- Greengram 93%
- Cotton 67%
- Wheat 14%
- Sorghum 91%
- Pearl millet 94%
- Finger millet 90%
- Maize 76%

Animal based Production System

458 m heads thrive in rainfed region (67%)

Animals per ha
- Dairy Animals / ha
  - 0.25 - 0.5
  - > 0.5
- Sheep & Goat / ha
  - 0.5 - 1
  - > 1

Strengths contd.....

Rainfed Farming Systems Typology in India, CRISAT
Diversified Socio-economic settings – scope for diversification in a Farming Systems Development Mode

The participatory research and development led to sustainable production systems has been realized

Continued efforts by National Agricultural System in developing location specific technologies

ICTs for technology dissemination, market intelligence etc.

Central /State govt. programmes/ schemes like area development on watershed basis, are available

Now, many stake holders up to community level are involved in development of rainfed agriculture

GoI, in XI FYP - High priority to rainfed agriculture with expectations of Second Green Revolution from rainfed regions
Weaknesses

Low soil fertility with multiple nutrient deficiencies

Frequency of Drought 1871-1999

Source: NBSSLUP

Agricultural Drought (Groundnut)
Shift to Irrigated Rice  Nallavelli watershed, Yacharam Mandal, Ranga Reddy district, A.P.
NARS technologies are largely accepted in ecologically and economically advantageous areas.

Efforts in upscaling of technologies is grossly inadequate.

High production risk because of higher input cost.

Labour intensive - sometimes non-availability of labour.

Slow adoption of new varieties for high seed rate and cost and low seed viability.

Acute fodder scarcity for the livestock.

Weak market linkages, interseasonal and interannual fluctuations in prices and distress sale of produce.

Poor socio economic base of the farmers.

Some Govt. schemes - disastrous in managing natural resources.
Opportunities

Enhancing water productivity - four water concept

Enhancing the cropping intensity, productivity of rainfed areas

Integrated farming systems for livelihood security - Soil-plant-livestock continuum needs attention

Indigenous knowledge to Modern Knowledge, finally acceptable and doable technologies - for ex. Soil conservation and rainwater harvesting

INM, IPM/NPM approaches - made some dent. Greater scope for scaling out in the specific domains

For “green consumers” - rainfed agriculture could be very useful in supply of organic foods and food materials

CPRS for biomass production, fodder development, livestock farming

Industry to play a key role in - seed supply, particularly oilseeds, commercial crops - in a PPP mode
Yield Gap in Rainfed Agriculture

Actual farm situation

Attainable yield

Feasible yield

Realizable yield

Achievable potential harvest

(100% yield of all crops)

Vittal et al., 2005

Print/audio information

(10, 42, 62% yield in coarse cereals, pulses and oilseeds)

Input supply

(26% yield in coarse cereals)

Do + demos/training

(37% yield in coarse cereals)

Do + monitoring

(53, 64 and 94% yield in coarse cereals, pulses and oilseeds)

- Lack of resource control
- Precision and timeliness
- Economically viable crops
- Water management
- Depletion in soil quality
- Desired quality seeds
- Mechanization

Un-bridged (yield) gap of 47, 46 and 6% in coarse cereals, pulses and oilseeds
Development of low risk technology for the rainfed areas

Management of the nutritional stresses

Farm mechanization with special importance on harvesting and post harvest processing and its extension

Augmentation of cultivation to paddy fallows and limited irrigation situations in rabi/summer

Development of faster seed replacement system for the spread of new cultivars through SHGs
Threats

*Changing rainfall pattern*

50% of cultivated area would still remain rainfed even the completion of envisaged river linkage

*Unabated Land degradation*

*Deterioration in soil quality*

*Multiple pests attack at a time*

*Monocropping with commercial crops*

*Alternate land use with block plantations in cropped areas*

*Indiscriminate groundwater use - No social regulation*

*Continued fluctuations in market price*

*NREGS - in non-creation of rural assets*

*Other location specific problems*
Our Preamble

More Crop and Income with Every Rain Drop and
Better Livelihoods of Rainfed Farmers
What has been done so far
Research, Regional Planning and Development of Agriculture:

- Agriclimatic Regions - Planning Commission
- Agroecological Subregions - ICAR (NBSSLUP)
- The core Rainfed Production System Domains - CRIDA-ICAR-NATP
- Agroclimatic Zones - NARP
Many Central and State Govt. schemes like IADP, NAWAPRA, DDP, DPAP etc. were implemented / are in place.

Now, NREGS, ISOPOM,NFSM, RKVY, NHM, Haryali etc. are in place.

Successful technologies with tangible benefits are available - NARS

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<th>Agroclimatic Zone</th>
<th>Rainfed Technology</th>
<th>Potential</th>
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<td>Agra, Aligarh, Mathura, Mainpuri, Etah districts in south-western semiarid zone of Uttar Pradesh</td>
<td>Higher mustard productivity in rainfed regions of Agra through supplemental irrigation with harvested rain water</td>
<td>Mustard is grown on about 79,000 ha in Agra district. With the adoption of supplemental irrigation to rainfed mustard, additional production valued at 79 crores could be realized. The capital and labour cost of farm ponds can be minimized by convergence with NREGS, soft loans to meet material cost and can be met from NREGS.</td>
</tr>
<tr>
<td>Kurnool, Anantapur (except south-eastern part) western part of Prakasam, southern part of Mahabobnagar and north - western parts of Kadapa covering scarce rainfall zone (Rayalaseema) of Andhra Pradesh</td>
<td>Tractor Drawn Ananta Groundnut Planter for scarce rainfall Zone of Andhra Pradesh</td>
<td>If the Ananta groundnut planter is used for sowing in the target area, a saving of around Rs. 11.25 crore can be achieved annually. The cultivable dryland area for groundnut can be increased by 25 to 30% in Anantapur region due to increased field capacity and timely field operations</td>
</tr>
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</table>
However, impact of a large number of technologies has been limited on the livelihoods of the rainfed farmers and the recent slow down in agricultural growth has resulted in widespread distress in this sector.

Non-adoption of NRM technologies is more to do with lack of proper Institutional and Policy Support and hence the solution for such problems does not lie in mere research.

Weak institutional linkages and lack of support systems such as transport, marketing, storage, processing and credit availability determine the extent to which the farmers absorb the technologies.

A scenario also exists now in some distress districts, forcing a large number of small and marginal farmers out of farming, their only means of livelihood. This will have implications on social and economic fronts both in rural and urban environments.
Another alarming scenario is that conversion of prime agricultural lands for non-agricultural activities like urbanization, industrial zones etc. In the process the first causality is core rainfed cropping zones.

To remain competitive and survive in the current economy, farmers must be insightful, innovative and ready to make changes.

In recent years, conventional wisdom has encouraged diversification with alternative enterprises and increased on-farm processing, packaging, and other means for adding value to raw products before they leave the producer’s hands. While this makes good sense, making diversification and value-added strategies work can be challenging.

These complex scenarios call for:
Transforming Rainfed agriculture into Rainfed Agro-Entrepreneurship.
Approach

Only in a new paradigm and in an entirely new target domain approach i.e.

Delineation of 'Rainfed Agro Economic Zones'
within and across agroclimatic zones/ core rainfed districts/tehsils.

Framework for Delineation at Microlevel - 1: 10,000 scale

- Agroclimatic Zone / Agroecological Unit - with latest info on climate variability, drought vulnerability etc.
- At core rainfed district (s) / part of district level
- Core Rainfed cropping /farming systems region - single/inter/double cropping scenarios + livestock etc.
- RAEZ - a minimum area of 5,000 ha
All programmes / schemes, will be converged

- to address natural resource management,
- issues related to production,
- processing,
- profitability and
- livelihoods improvement.

Developing micro and mesolevel Rainfed Agro-entrepreneurship - within a Rainfed Agro-Economic Zone (RAEZ) as hubs of rainfed agriculture development.

Ex. crop/enterprise groups like groundnut based, cotton based etc., goat/sheep rearing, poultry based, fodder based, dairy based, MPTs plantations based, sericulture based, even seed production based etc.
Tools like crop or weather insurance, where the insurance product may have an inbuilt condition that a given product is applicable only if a particular crop or commodity is grown in RAEZs where in the govt. can subsidize part of the premium for farmers who adopt scientific land use or rational water use.

New opportunities are also arising in the area of CDM and carbon credits which can be implemented in RAEZs where farmers can be compensated for adopting conservation practices which contributes to scientific land use and sustainable productivity on a long term basis, but relatively lower returns on short term.

**RAEZs - Functional Mechanism**

To be developed at RAEZ level in a district/region in a consortium mode, involving all the concerned stakeholders and converging all the relevant resources, programmes, schemes and pooling resources (human, financial etc.).

Then redesign the strategic interventions, now available and also develop new, which will cover crop production, horticulture, livestock, NRM, post harvest technology and value addition and market related issues.

These RAEZs are contemplated to achieve making rainfed agriculture a viable economic activity of the majority of the farmers.
Rainfed Agroentrepreneurships in a RAEZ at Macrolevel

A Framework for Development of Rainfed Agroeconomic Zone – Farming Systems Development Approach

**Scale/ Unit**
- 1:4000/ Farm
- 1:10000/ Watershed
- 1:50000/ District
- 1:10000/ Watershed
- 1:50000/ District
- 1:100000/ State
- 1:10000/ Watershed
- 1:4000/ Farm
- 1:10000/ Micro watershed

**System**
- **Rainfed Production System**
  - Predominant crops/ Cropping regions
  - Livestock/ Draught

- **Rainfed Farming System Zones**

- **Improved Dyrland Technology**
  - Rainwater management
  - Crop management
  - Integrated Nutrient management
  - Integrated pest management
  - Alternate land use
  - Farm implements
  - Alternate farming systems

- **Indigenous Knowledge**

- **Biophysical Land Evaluation**

- **Socio Economic Evaluation**

- **Alternate Land Use Systems**
  - Parkland, Agrohorticulture, Agrisilvipasture, Apiary, Agroforestry, Silviculture, Silvipasture, Sericulture
  - Livestock, Economic Shrub etc.

- **Farming Systems Alternatives**

- **Options**
  - Biodiverse Rainfed Farming Systems Modules
    - Drought mitigation
    - Land quality improvement
    - Staggered income
    - Profitability

**Stakeholders**
- NARES
- Farmers
- SGLDs, GOI
- NARES
- Farmers/ Community
- NARES
- Farmers Community
- NARES, NGOs
- Community/ Farmers/ Policy, institutional & Market support
- Market forces etc.

**Ravindra Chary et al, 2009**
Thank You