

# Overview of the Rainfed Areas

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# Dryland Agriculture Vs Rainfed Agriculture

## 1. DLA

- Water conservation
- Sustainable crop yields
- Limited input use
- Both wind and water erosion

## 2. RFA

- Disposal of excess water
- Maximization of crop production
- High level of input use
- Water erosion
  - Both exclude irrigation
  - In tropics 750mm annual rainfall is the cut off between DLA&RFA (Burnett, 1985)

# Agroclimatic zones

Zone	Rainfall (mm/yr)	Moisture Index (MI)	Area	
			In Mha	As %
Arid	Upto 500	< -66.7	45.6	14.0
Semiarid	500-850	-33.4 to -66.6	123.4	37.6
Dry Sub humid	850- 1000	0 to -33.3	54.1	16.5
Humid	> 1000	0 to >100	99.7	30.5

## **Agroclimatic zones (contd.)**

*Lower the rainfall higher is the frequency of  
drought*

*In all 91 districts are drought prone*

*Area prone to desertification: 223.1Mha  
(68.1% TGA)*

*UNEP (1992), Velayutham et al (1999) and  
Krishnan (2006)*

# Land Degradation

- Soil erosion alone** : 4.1 % loss in production per annum (Bansil, 1986)
- Overall annual loss** : 4 – 6% GDP (UNDP)
- CWSCR&TI** : 3.0 ha / minute (1997-2020)
- ISRIC (Bai *et al* 2008)** : 4.9 ha / minute (1981 to 2003)
- Degradation of Commons** :
  - Pastures : 23 % (NRSA)
  - Forests : 52 % (NWDP)
- Loss in agro-biodiversity** : More with LMF

# Socio-economic scenario of rainfed areas

- 84% of the poor live in RFA
- 65% Livestock
  - Contribution of livestock in HH income
    - Arid: Upto 70%
    - Semiarid: Upto 40%
- Income generation in RFA
  - Crops: 70 to 83%
  - Dairy: 9 to 20%
  - Fruits & Vegetables: 3 to 13%
  - Small ruminants : 2 to 5%

*Source: ICRISAT (1994); XIFYP supporting documents(2006) ;NRAA(2008)*

# Problems with RFA

## 1. Landscape

- High spatial variability
- Multiple slopes
- Variable depth ; texture
- All these call for location specificity: isoline concept

## 2. Soils

- Not only thirsty, but hungry too
- SOM continuously decreasing
- Consequently secondary and micronutrient disorders also observed
- Humid areas highly leached, low active clays, inadequate in Ca, P Tribal Communities more

# Problems with RFA (*contd.*)

## 3. Soil – water relations

- Highly variable
- Rainfall distribution; amount affects soil water
- Decrease in SOM leads to poor resilience against moisture stress

*Note: Soil testing for RFA must also include Soil- Water relations*

# Unique Constraints in RFA

- Subsoil Salinity: 30% area in Deccan Plateau (NI Karnataka, adjacent districts of Andhra Pradesh and Maharashtra)
- Hard pan areas: About 6% area of west Rajasthan is underlaid with hard pan of  $\text{CaCO}_3$
- Textural profiles: Widely distributed in red soils of south India and deep black soils of Deccan plateau

## Unique Constraints in RFA (contd.)

- Shallow soils: 18.7 Mha spread over in Deccan plateau
- Coarse textured soils: 30.0 Mha in Madhya Pradesh, Orissa, West Bengal, South India
- Steep Sloping Lands: 51.1 Mha spread over NE Ranges (Himalayan & Bhahmaputra Valley), Hill ranges (East & Western Ghats)

# Landuse Planning (LUP)

- **Imposing LUP from above MUST STOP**
- **Simple LUP by the land users**
- **Only complementary support from outsiders**
- **Planning process is more important than the plan itself**

*- Lundgreen and Taylor (1993)*

# Resource Conservation

- Move from Soil Conservation to Land Husbandry
- Land Husbandry
  - Care,
  - Management, and
  - Improvement of land resources
- Aimed at improved, sustainable production

- Hudson (1992)

*Note: NREGP / WDP funds be used for land husbandry*

# Rainwater Harvesting

- **Till recently**

- Traditional water harvesting systems (TWHs) were the only source of irrigation in hinterlands
- They were managed by people

- **Now**

- Governments stepped in to politicize the systems
- New structures (CDs, PTs, LBSs, RFDs, borewells etc.) capturing >30% runoff affecting hydrology

# Rainwater Harvesting (contd.)

- **Consequence**

- TWHSs are drying up
- Poor have less access to harvested water

- **Civil Societies Interventions**

- Sharing the water from community structures (e.g. *Pani Panchayat* of Salunke; Sukhumajri of ICAR);
- PHM of Andhra Pradesh Wells Project;
- PIM of CWS

# Need for improving Productivity of RFA

- Reddy (1971), former RBI Governor, called for separate effort by SDA on RFA
- Kerr *et al* (1999) said the growing demands for food can come only from RFA
- Prime Minister called for second GOR through RFA and SMF (2005)
- So said the Planning Commission (2005)
- RFAA established in November 2006

# How to achieve improved productivity

Source	Focus
NCA (1976)	Millets, pulses, organics
Brady (1982)	Specific varieties of RFA
Dwarakinath (2000)	Separate extension for smallholders
Jha (2001)	R&D for smallholders
Prem Narain (2003)	Dialectical approach in production systems
FAO (2007); Civil societies	Simple, doable, environment friendly technologies
Altieri (2008)	Revitalize small farms
Narayan Reddy (2009)	Adopt ecological farming

# Production technologies

- **Timeliness and precision cardinal principles**
- **Improve SOM, Provide funds, Subsidize on-farm management of organics**
- **Encourage farmers to move from dependence to independence**
- **Evolve doable, internalizable technologies based on ITK**

# **Production technologies (contd.)**

- **Ecological farming need be goal**
- **Tap synergies in crop, tree and livestock**
- **Such systems cool the climate**
- **Pay for the environmental services to the practitioners  
of such ecological farming**

# Need for differential agricultural policy for RFA

## 1. Background

- Habitat of 84% of the poor, 65% of the livestock
- Ecologically and economically disadvantaged
- SOM vanishing, productivity depleting, degradation of NRs serious
- High spatial variability, technologies need be location specific
- TFP more in RF agriculture

# **Need for differential agricultural policy for RFA (*contd.*)**

## **2. Action needed**

- **Move from soil conservation to land husbandry**
- **Improve SOM, subsidize on-farm management of organics**
- **Exclusive dispensation for**
  - **Research (e.g. variety matching with ecology, climate change)**
  - **Extension (smallholders)**
  - **Drought (short & long term mitigation efforts)**
  - **Value chain (all production systems)**
- **Address microenvironments with unique constraints**
- **Include physical parameters like soil-water in soil testing**

# Suggested Policy Initiatives

- **Combat desertification: Establish National Land Resource Centre; Adopt Land care model**
- **Move to land husbandry**
- **Limit RWHs to capture not more than 30% runoff.**  
**Research for RWHs needed to meet climate change**
- **Involve soil testing labs in addressing physical parameters like soil-water**

## **Suggested Policy Initiatives (contd.)**

- **Launch literacy drive on RFA, climate change, ecological niches for production systems, water, quality (meeting needs of green consumers, green pharmacy) and market intelligence**
- **Adopt value chain model in production systems**
- **Provide subsidies for improving SOM, adopt land husbandry through NREGP / WDP**
- **Pay for the Environmental Service rendered by practitioners of ecological farming**

Thank you