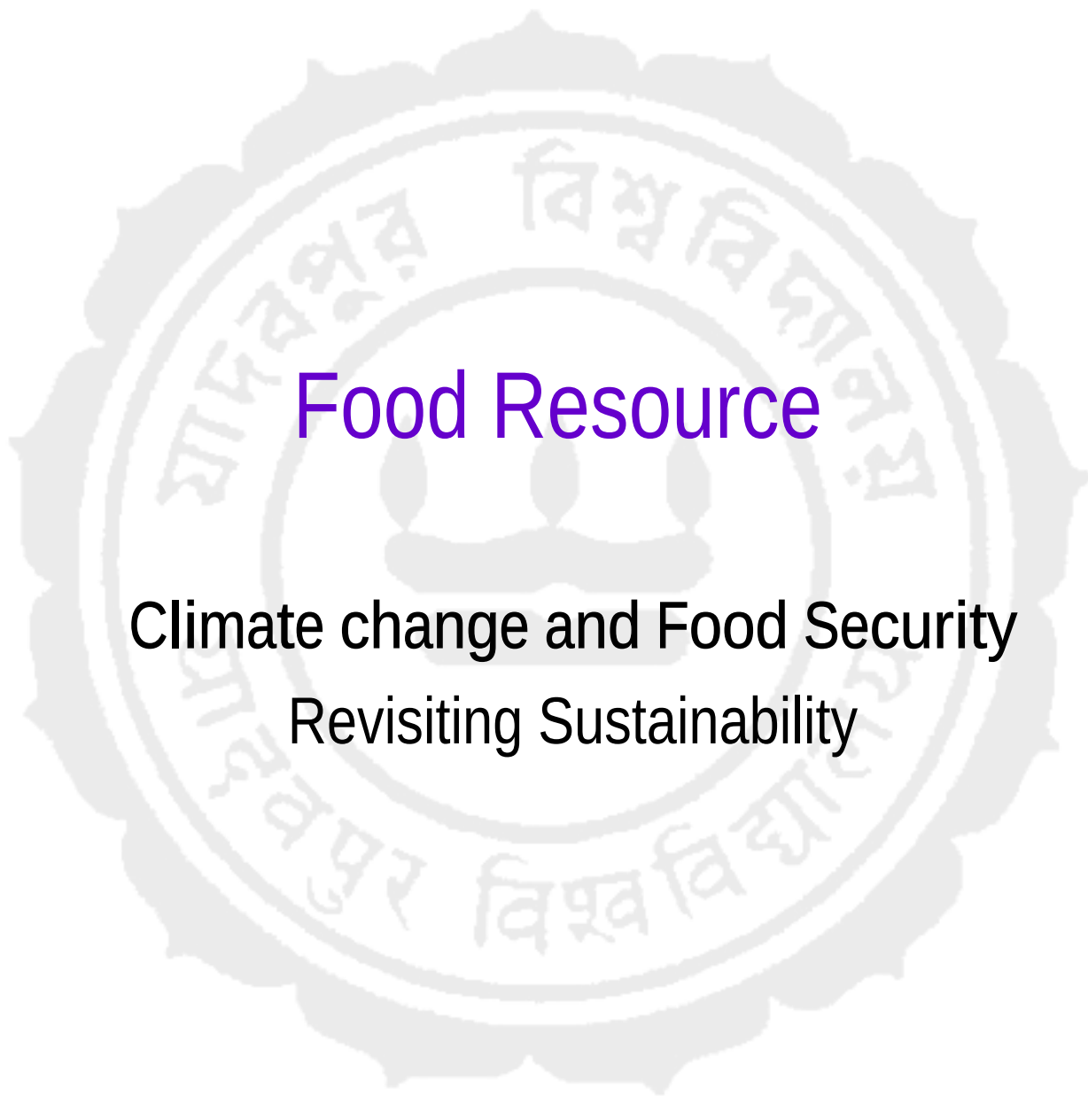




Food Resource

Climate change and Food Security

Revisiting Sustainability

Some Basic Information

- ❑ Source of food – agriculture, animal husbandry and fishing
- ❑ Minimum dietary requirement
1825 cal/person per day
on an average (*FAO 2003 -05)
- ❑ World agricultural population per hectare 1.7 person –food production as livelihood
(*FAO 2003 -05)



Significant Factors

- ❑ Increasing population implies less per capita food availability

World population growth rate = 1.2% (2005) US census bureau, international database

- ❑ Relation between population growth and growth in food production becomes important

Food production in 64 out of 105 developing countries lagging behind their population growth rates (FAO, 2003-05)

World Food problem

Country/country group	No. of people malnourished	% pop malnourished
World	848 million	13
Developed country	15.8 million	<5
Developing country	832 million	16
India	230 million	21

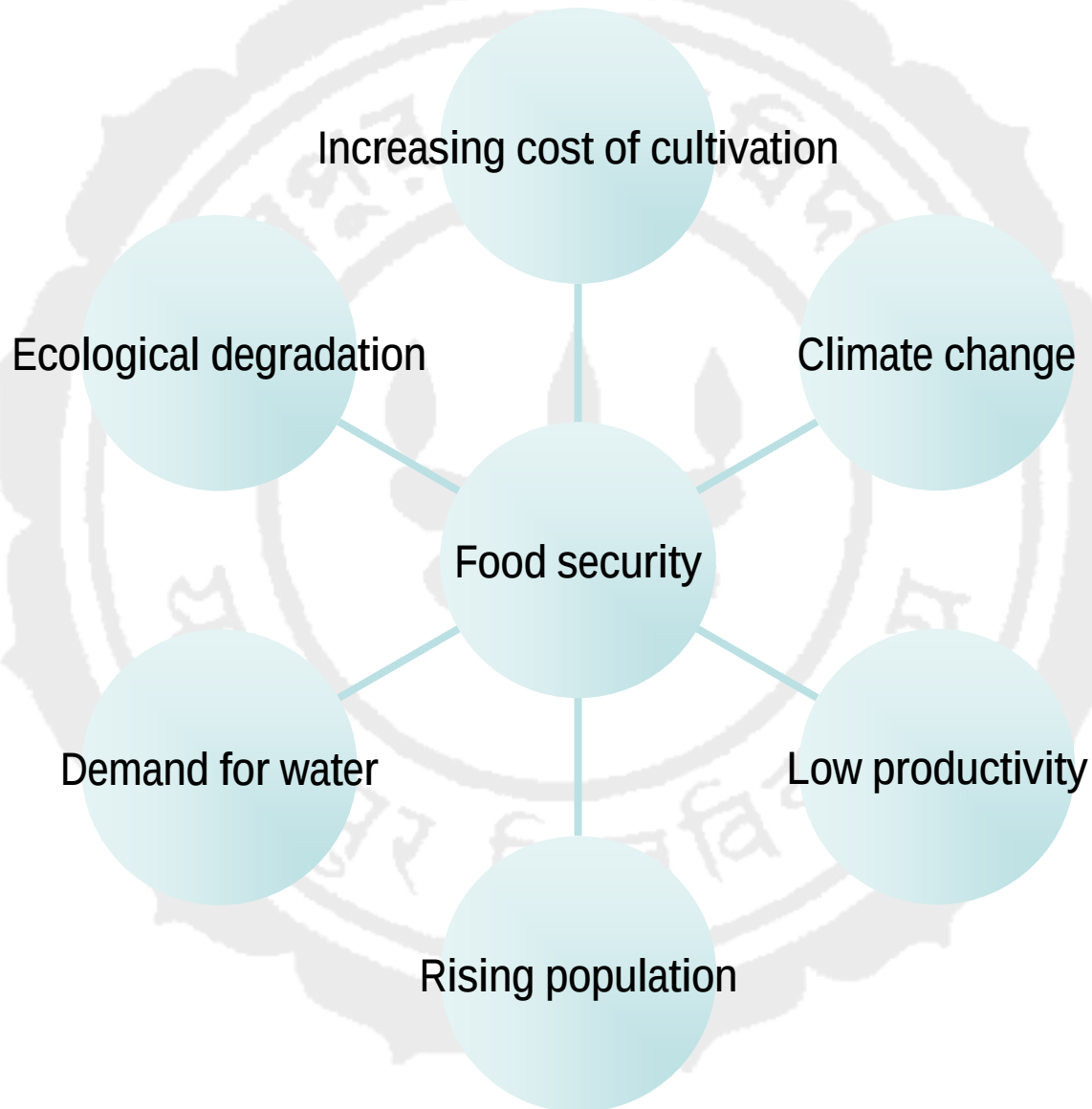


Source: FAO (2003-05)

Indian Scenario

- ❑ 700 million dependent on agriculture
- ❑ From 1993-95 to 2003-05 average annual rate of change of
 - population = 1.7%
 - food production = 1.6%
 - food per person = -0.1%
- ❑ From 1951 to 1997: **gross irrigated area** (GIA) (includes double cropping) expanded four - fold, from 23 M Ha to 90 M Ha
- ❑ With creation of irrigation potential of 89.56 M Ha by 1996-97, India has the **largest irrigated area** among all the countries in the world

Problem of Food Security



Unsustainable Agriculture

- ☐ Modern agricultural pattern pollutes environment with excessive use of pesticide and fertilizer
- ☐ Monoculture (single crop) enhances the risk of production
- ☐ Need for Increasing demands for food
- ☐ Reducing/ stagnating crop yields: fatigue of intensive agriculture and climate change

Unsustainable Agriculture (Contd.)

- ❑ Incremental use of inorganic fertilizer and pesticide
- ❑ The **inefficient water pumping** in the agriculture sector also has its impact on global warming and climate change through the emission of the GHG.
- ❑ global **impacts** of climate change and global warming on agriculture are – *Net loss on world's food supply*

Overexploitation of Resource

- ❑ Reducing availability of natural resources for agriculture
- ❑ Need for increased resources: land, water, fertilizers, capital
- ❑ Soils are being exploited faster than they can recuperate
- ❑ Excessive conversion of forests, grasslands and wetlands to agricultural land
- ❑ Fish resource, both marine and inland, show evidence of exhaustion

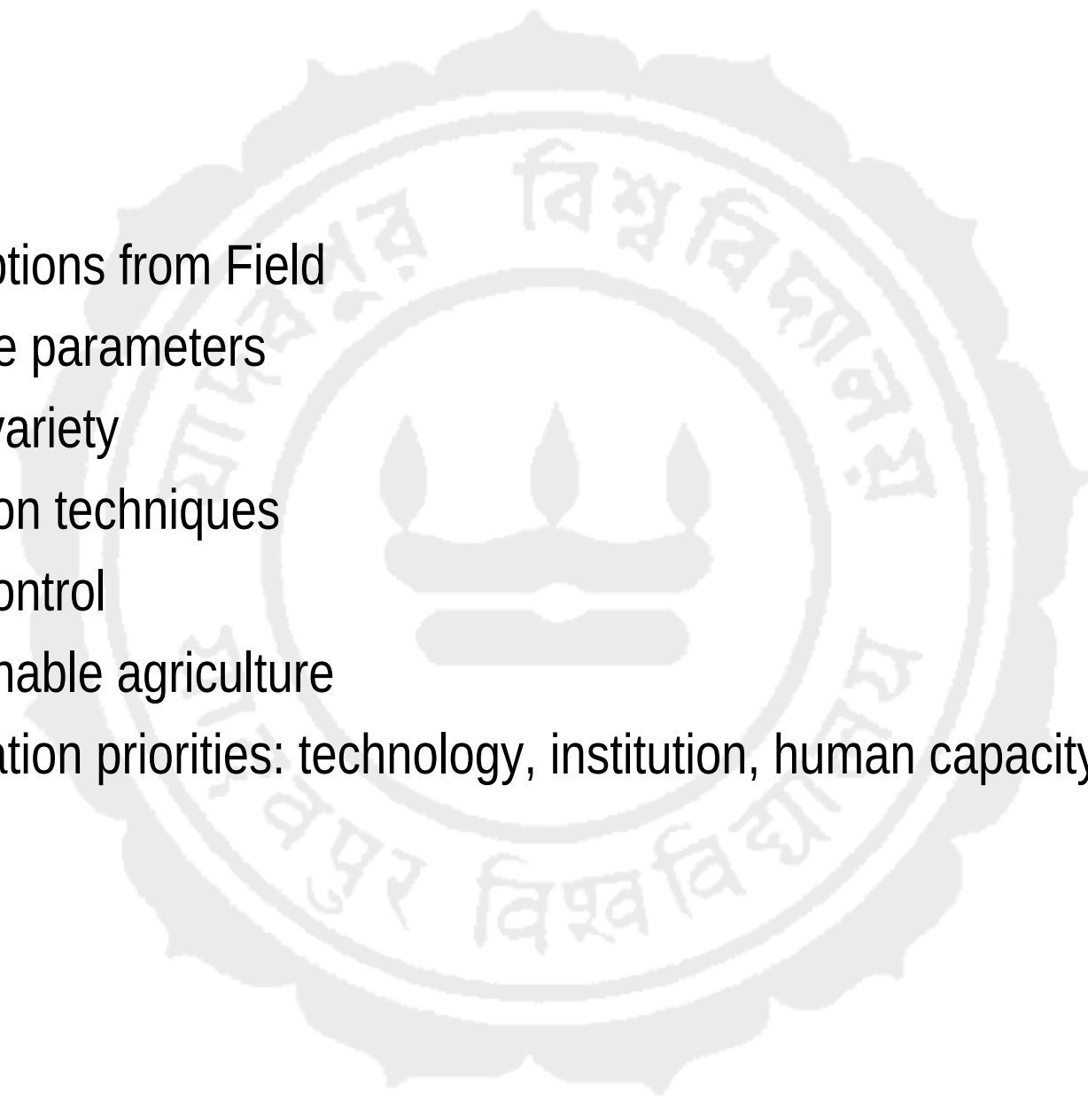
Cropland Management

There is thus an urgent need for integrated cropland management and preservation of environment

It includes...

- ☐ Water management
(irrigation, drainage)
- ☐ Rice Management
- ☐ Agronomy
- ☐ Nutrient management
- ☐ Tillage/residue management
- ☐ Agro-forestry
- ☐ land-use change



- 
- ☐ Perceptions from Field
 - ☐ Climate parameters
 - ☐ Seed variety
 - ☐ Irrigation techniques
 - ☐ Pest control
 - ☐ Sustainable agriculture
 - ☐ Adaptation priorities: technology, institution, human capacity building

Specific Information Needs

- ☐ Impact on food (crops, milk, fish) demand and supply- spatial and temporal differences
- ☐ Impact on nutrition- cereals, legumes, oil crops
- ☐ Impact on commercial crops (quality and quantity)- spices, tea, coffee, medicinal plants
- ☐ Impact on trade- internal and external
- ☐ Impact on natural resources- soil, water and air
- ☐ Impact on farmer's livelihood
- ☐ Options to enhance adaptive capacity- farmer level, regional differences, government level
- ☐ Potential of agricultural land as carbon sink
- ☐ Policy implications: link with current development plans

Information Needs on Vulnerability

- ☐ Can we remain self-sufficient in food despite global climatic changes, urbanization and trade liberalization?
- ☐ Which regions and the social groups are more vulnerable to climatic changes?
- ☐ How will enhanced climatic risks affect livelihoods of resource-poor farmers-hill, coastal, tribals?
- ☐ How should different farmers adapt to cope with climate change? (in the background of changing scenario of demand and markets)

Mitigation of Climate Change/ Feedbacks on Environment: Information Needs

- ☐ Can alternate land use systems such as plantations and agro-forestry increase carbon sequestration and yet meet food demand?
- ☐ How much area can be taken out from agriculture for forestry; where and what policy measures would be needed?
- ☐ How much carbon is conserved by limited tillage options? For how long?
- ☐ What is the potential of biofuels for carbon mitigation; what policies and technologies would ensure their adoption by farming community?

Sustainable Initiatives

Israel's drip irrigation system enhanced the efficiency of irrigation by 95% -food production almost doubled



Calcutta releases waste water into surrounding lagoons – water is used for fish raring and growing vegetables