




PRESENTATION TO DTI DELEGATION

Overview of Research and Development Efforts at CSIR-Ghana

Victor K. Agyeman PhD., ESQ.

Director-General

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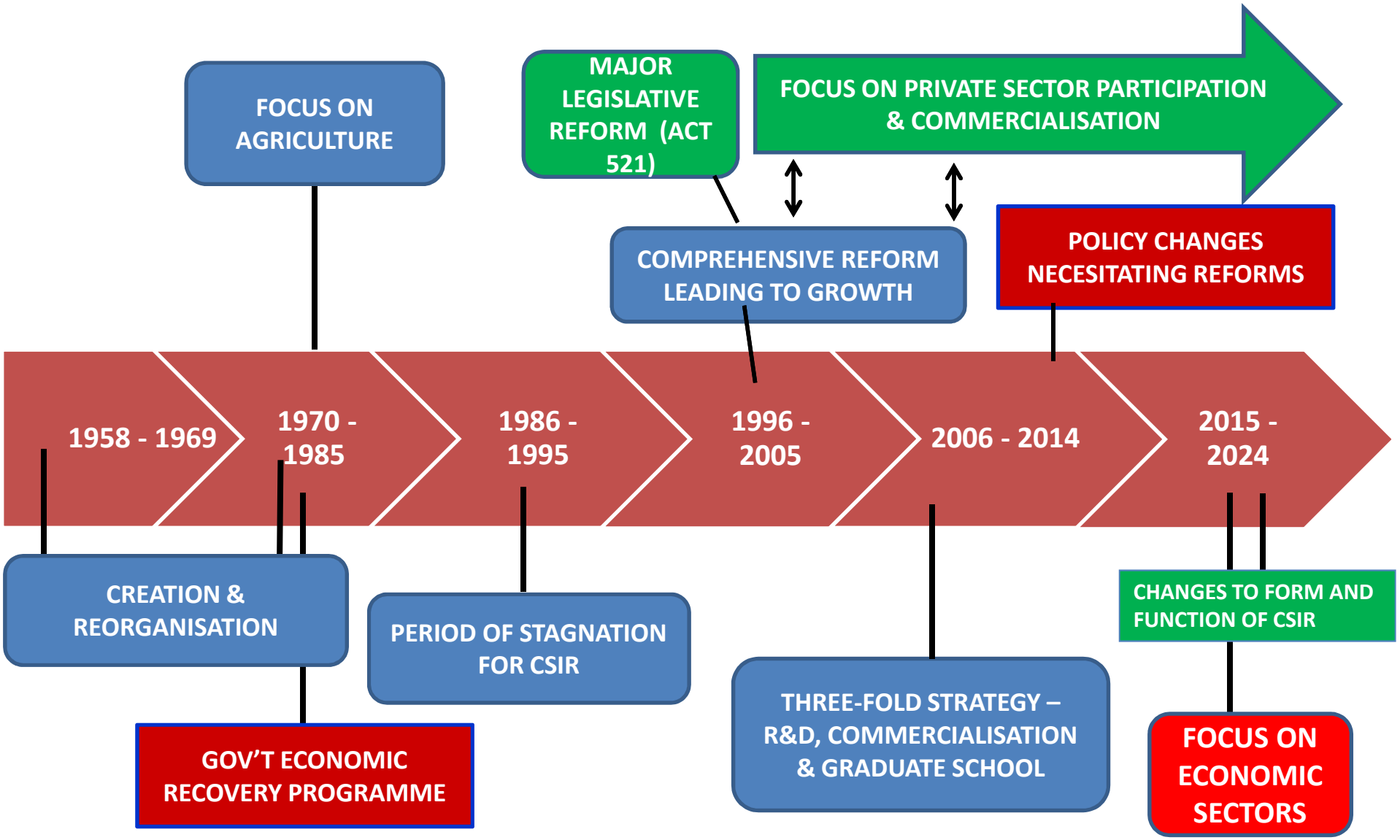
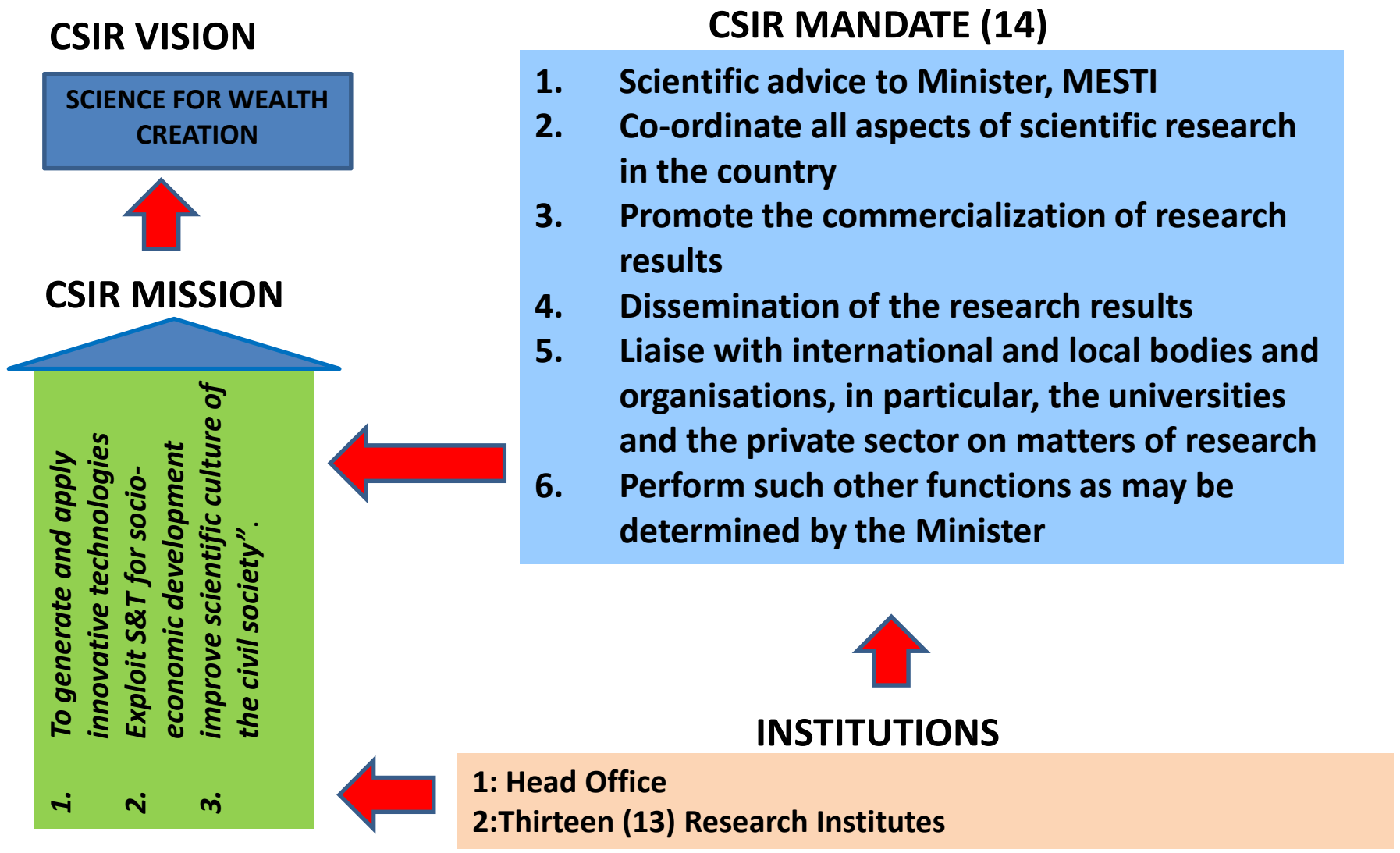
HISTORICAL PERSPECTIVE OF CSIR AND FUTURE DIRECTION



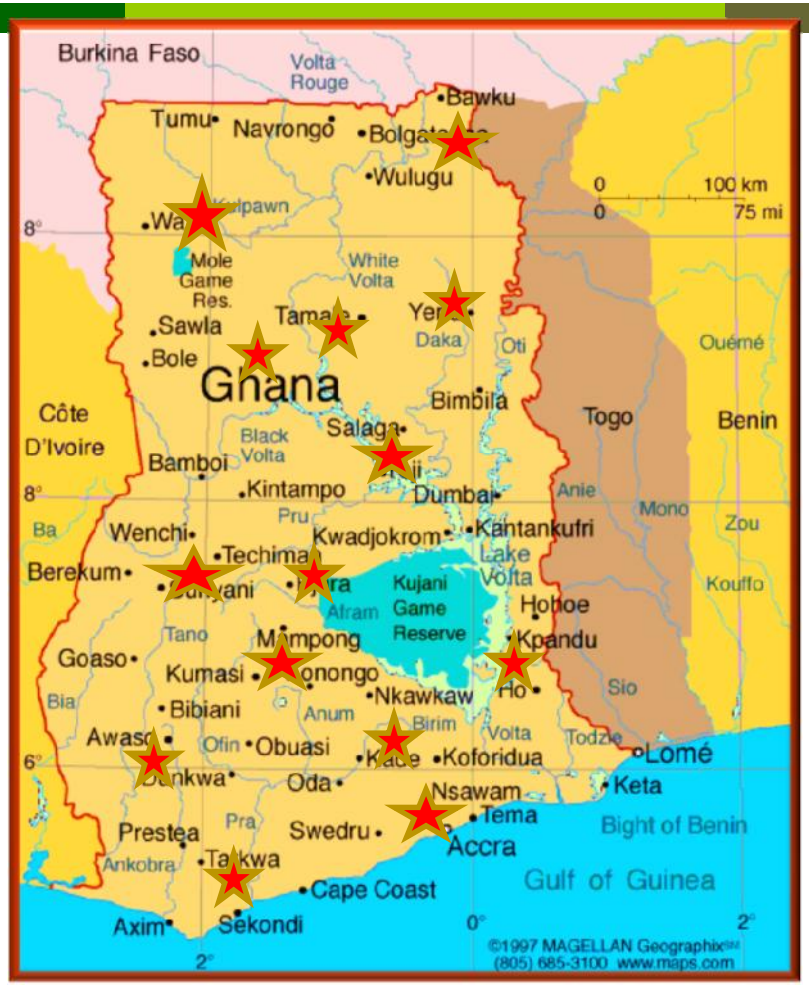
CSIR VISION MISSION AND MANDATE



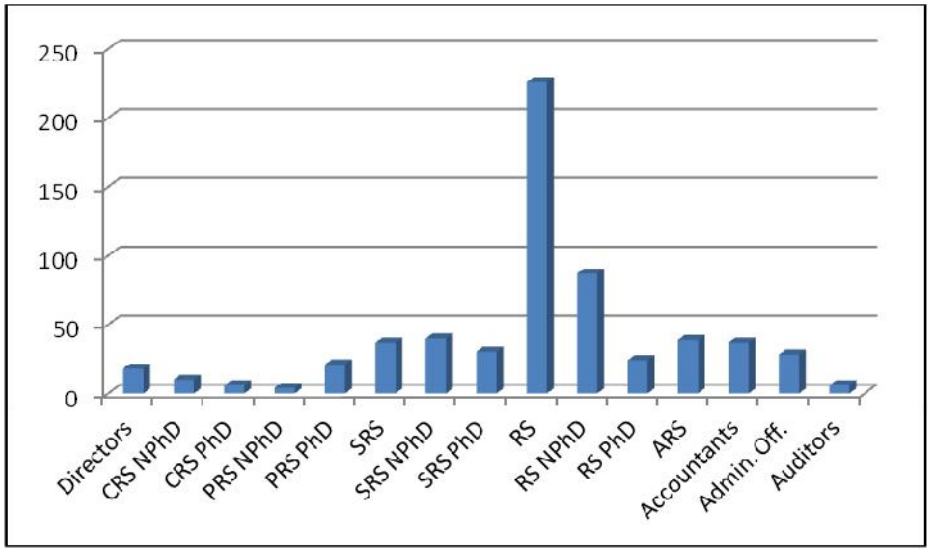
CSIR INSTITUTES

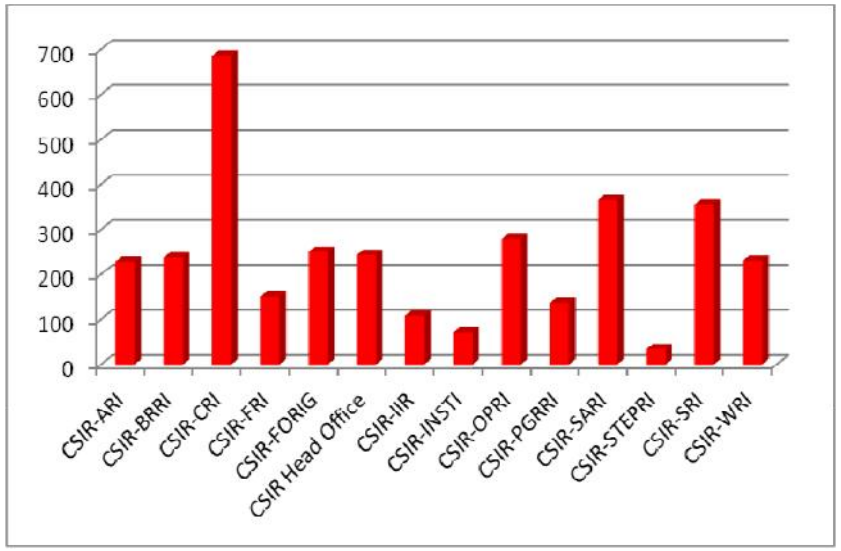
- Animal Research Institute (ARI - *Accra*)
- Building and Road Research Institute (BRRI - *Fumesua*)
- Crops Research Institute (CRI - *Fumesua*)
- Food Research Institute (FRI - *Accra*)
- Forestry Research Institute of Ghana (FORIG - *Fumesua*)
- Institute for Scientific & Technological Information (INSTI - *Accra*)
- Institute of Industrial Research (IIR - *Accra*)
- Oil Palm Research Institute (OPRI – *Kade*)
- Plant Genetic Resources Research Institute (PGRRI - *Bunsu*)
- Savanna Agricultural Research Institute (SARI - *Nyankpala*)
- Science & Tech. Policy Research Institute (STEPRI - *Accra*)
- Soil Research Institute (SRI - *Kwadaso*)
- Water Research Institute (WRI - *Accra*)
- *Biotechnology and Biomedical Research Institute – Proposed by Council*

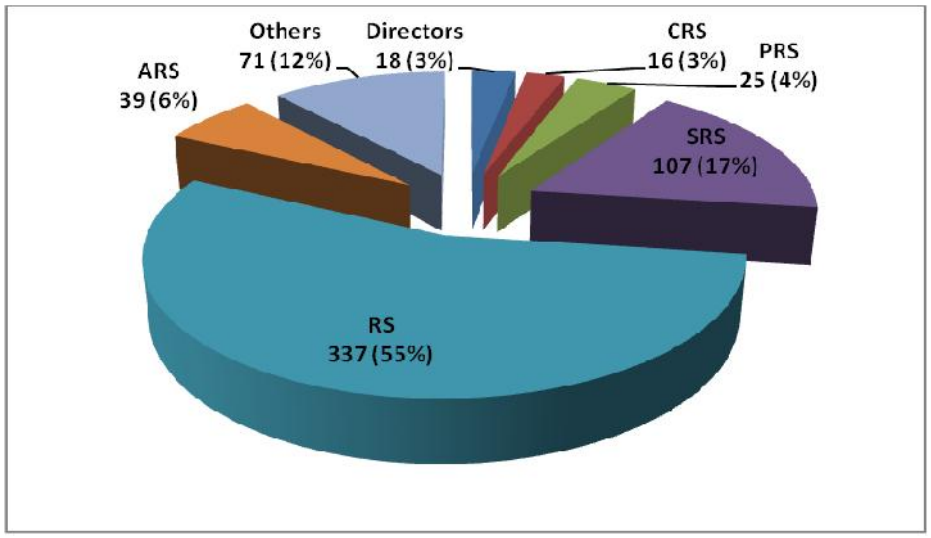
CSIR NATION-WIDE



NUMBER OF SCIENTISTS IN DIFFERENT CATEGORIES AND INSTITUTES



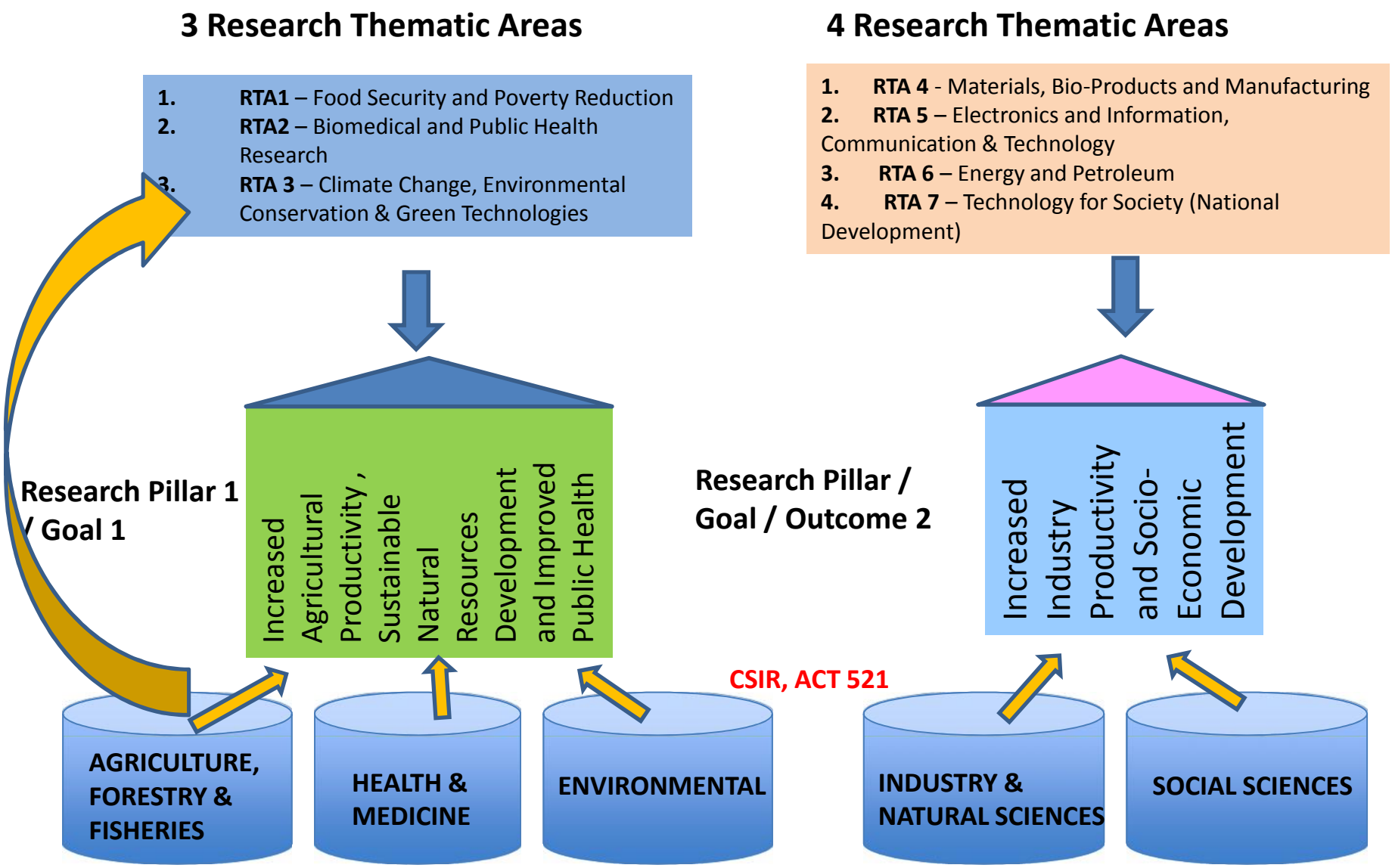




Research Scientists – 525
Senior Admin Staff – 120
Technologists - 985
Other Staff (junior) - 2010
TOTAL - 3,640

PHD Holders **- 35%**
[Range of 20% (Engineering based) - 60% (Agric based)]

NEW CSIR RESEARCH AGENDA



P1: FOOD SECURITY AND POVERTY REDUC

FOOD SECURITY & POVERTY REDUCTION: Sub-Programmes

- P1.1 Grains, and Legumes
- P1.2 Root, Tubers, Horticultural (Vegetables & Fruits) and Industrial Crops
- P1.3 Trees and Plant Resources (Natural Products)
- P1.4 Livestock and Poultry
- P1.5 Fisheries and Aqua-culture
- P1.6 Mechanisation, Agro-Food Processing [Agri-business?] and Value Chain Promotion (Cross-Cutting)

CLIMATE CHANGE & ENVIRONMENTAL CONSERVATION

CLIMATE CHANGE, ENVIRONMENTAL CONSERVATION & GREEN TECHNOLOGIES: Sub-Programmes

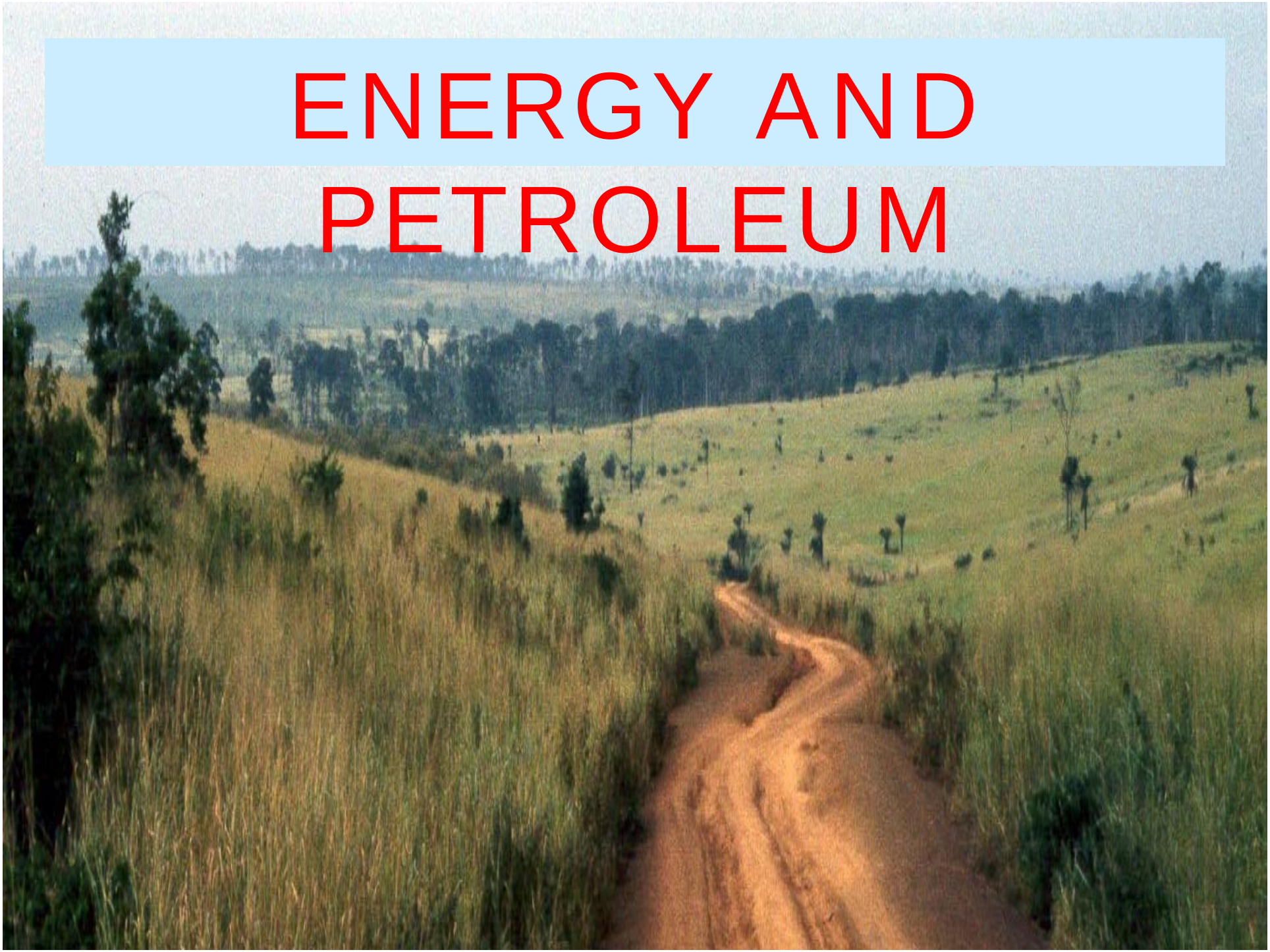
- P2.1 Soil, Water and Biodiversity Conservation
- P2.2 Climate Change Mitigation (Including REDD+)
- P2.3 Climate Change adaptation and Social Development
- P2.4 Pollution and Waste Management, (Including Bio-Remediation)
- P2.5 Green Technologies for Sustainable Development

MATERIAL SCIENCE AND MANUFACTURING

MATERIAL SCIENCE & MANUFACTURING: Sub-Programmes

- P3.1 Material Science (Wood, Metals, Integrated Materials)
- P3.2 Industrial Products (Bio-Resource and Bio-Products Engineering)
- P3.3 Nanotechnology and Nano Products

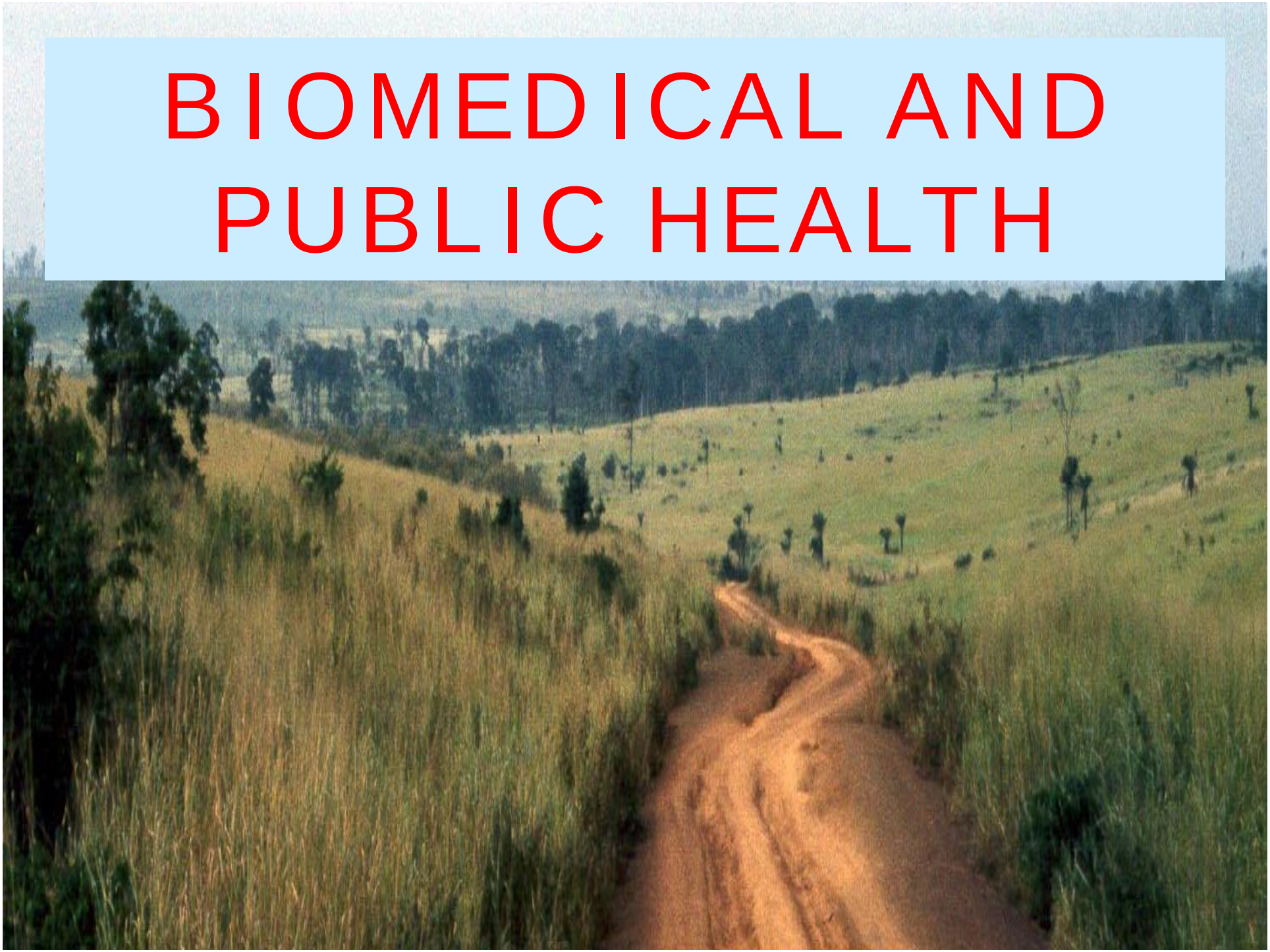
ENERGY AND PETROLEUM



ENERGY AND PETROLEUM: Sub-Programmes

- P4.1 Oil & Gas, including Cathodic Protection System)
- P4.2 Renewable Energy (including Bio-energy and Bio-gas)
- P4.3 Energy Products, including Bitumen
- P4.4 Metrology and Industrial Engineering

BIOMEDICAL AND PUBLIC HEALTH

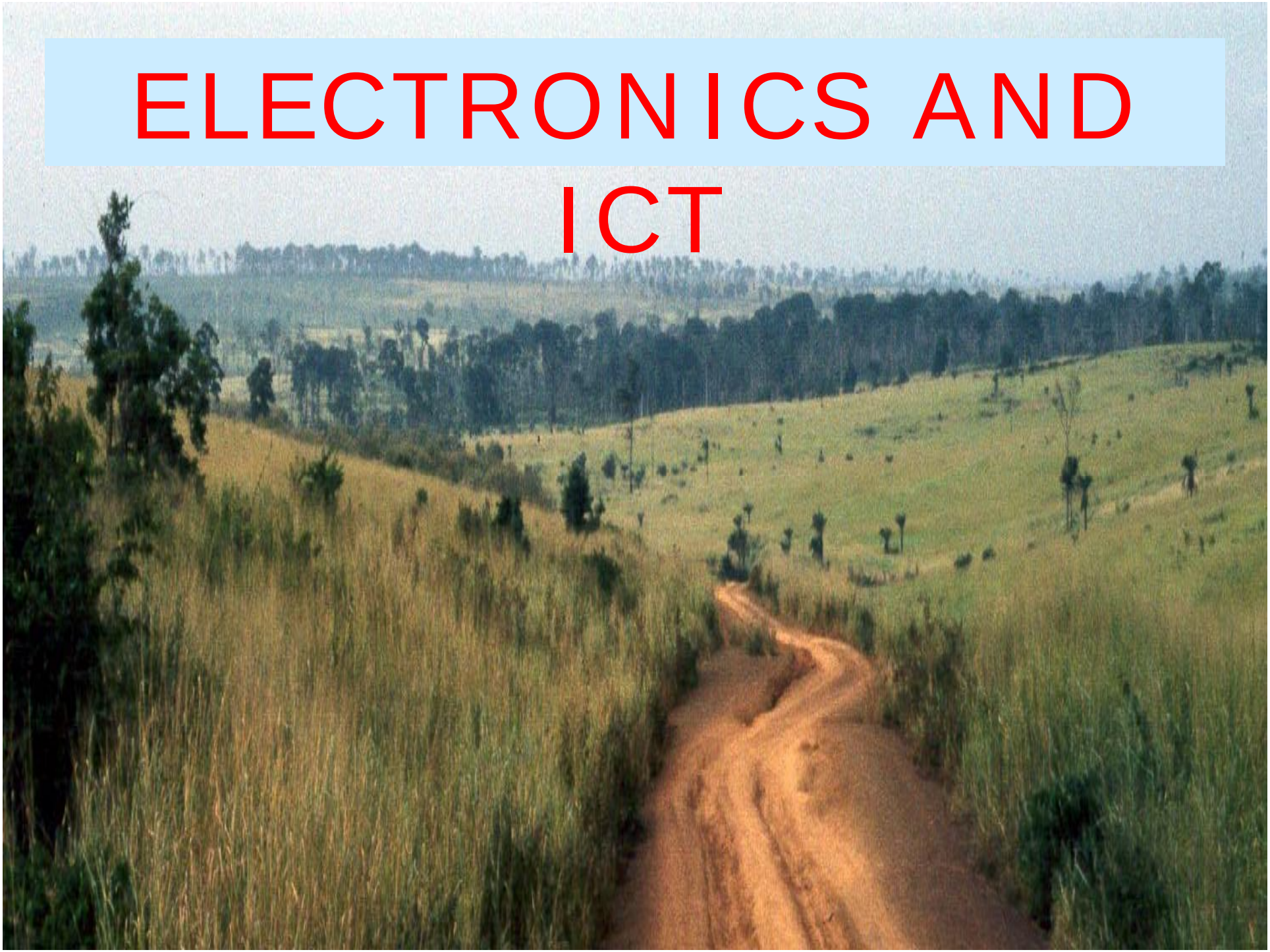


BIOMEDICAL AND PUBLIC HEALTH:

Sub-Programmes

- P5.1 Plant and Animal Health (Pathology, Entomology, Micro-Biology, Molecular Biology, Cell Biology)
- P5.2 Genetics, Germplasm Conservation, Bio-prospecting and Bio-processing
- P5.3 Bio-Informatics, Bio-Physics and Bio-Chemistry
- P5.4 Biomedical, Biosafety and Ethics

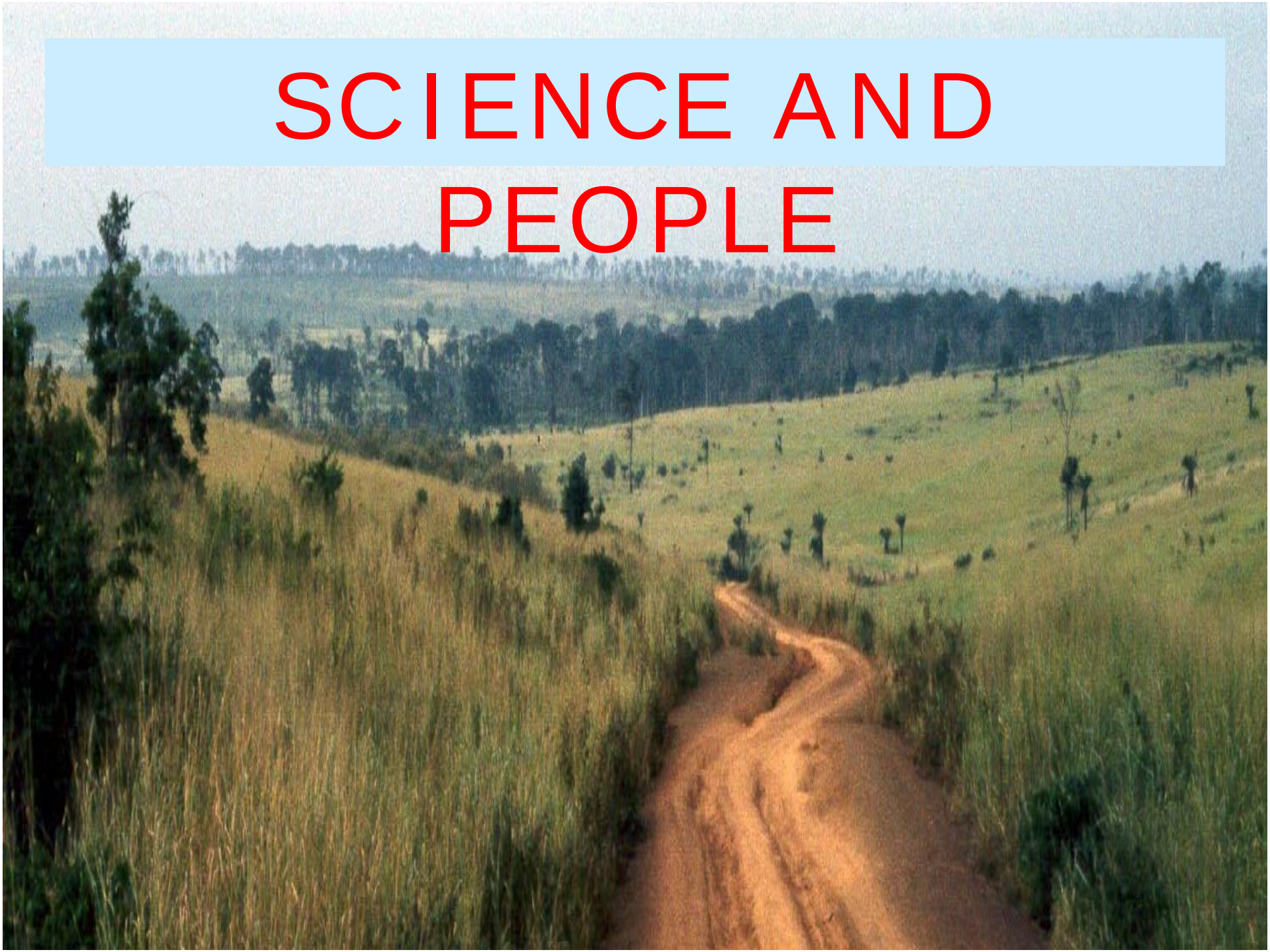
ELECTRONICS AND ICT



ELECTRONICS AND ICT: Sub-Programmes

- P6.1 Computing and Software Systems (Electronic and Computing Engineering)
- P6.2 Electrical and Electronic Systems and Design
- P6.3 Information and Communication System, including Geographic and Management Information System
- P6.4 Robotics and Mathematical Sciences

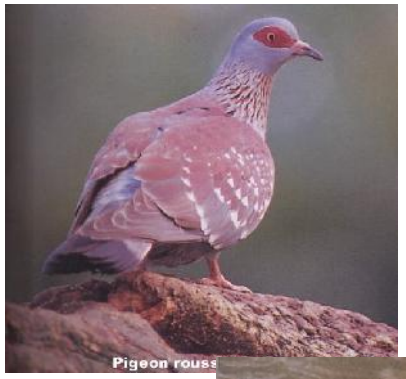
SCIENCE AND PEOPLE

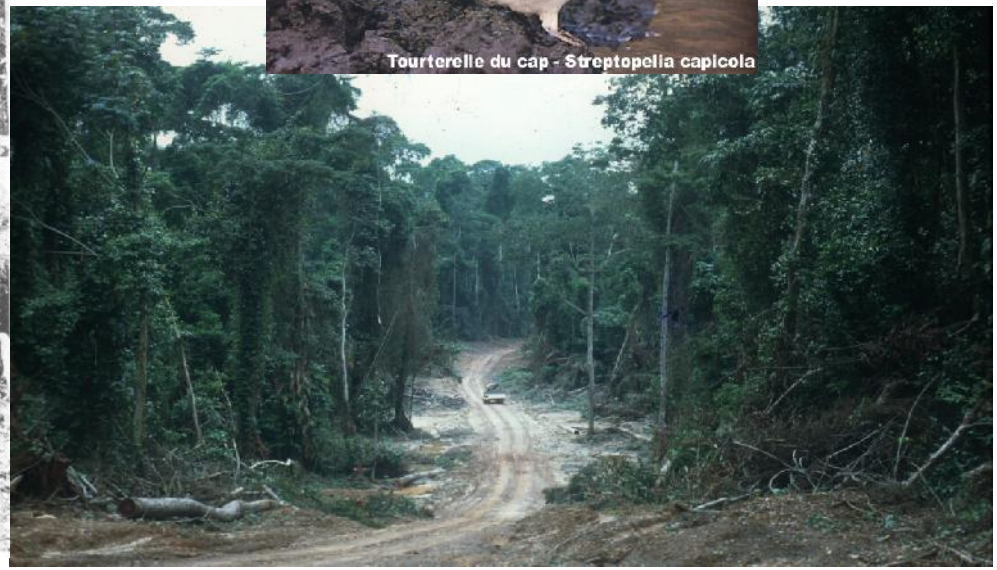


SCIENCE AND PEOPLE: Sub-Programmes

- P7.1 Policy and Governance
- P7.2 Statistical, Social and Economic Research
- P7.3 Culture, Indigenous Knowledge and Community Improvement
- P7.4 Technology for Livelihood and Wealth Creation

ACHIEVEMENTS AND AREAS FOR COLLABORATION





ENERGY RESEARCH

WIND

OIL &
GAS

BIO-FUEL

BIOGAS TECHNOLOGY

- CSIR has introduced the biogas technology.
- The Ministry has currently developed a strategy for the diffusion of biotechnology in the construction of bio toilets.

process

ENVIRONMENTAL BIOLOGY

- **Enhancement of public health status through sound environmental and water pollution control strategies.**
  - ***Assessment of bacteriological water quality.***
  - ***Identification and control of water-borne, water-related diseases.***

VECTOR-BORN DISEASES MGT

ONCHOCERCIASIS CONTROL

- **Oncho or river blindness is a parasitic disease caused by *Onchocerca volvulus* transmitted the blackfly vector (*Simulium damnosum*).**
- **Transmission intensity usually higher in fertile river valleys where many villages have been abandoned.**

SURFACE WATER

- **Water resources for agriculture: Livestock and irrigation.**
- **Hydrographical surveys.**
- **Appropriate rainwater harvesting systems for domestic and industrial supply.**

GROUND WATER: PROVISION OF WATER

- **Ground water exploration**.
- Drilling of wells for communities, etc.
- Assessment of water quality.
- Construction of infiltration galleries behind dams.

ROADS AND HOUSING -
Promoting Local Building Materials

- CSIR-BRRI low cost technology employing **bricks** and **pozzolana** cement.
- Pozzolana can replace up to 40% of cement for construction.
- Reduces cement price by at least 18%.
- Improves resistance of cement against sulfates attack.
- Production facility at BRRI produces 300 bags/day.

Bricks for construction industry developed by CSIR-BRRI

ADHESIVES

- HQCF good extender for the manufacture of plywood.
  - *Technology minimizes wear on cutting tools due low ash content.*
  - *Provides tack to the glue and promotes faster and more complete cures.*
- Total adhesive mix is 20% HQCF and 80% Wheat Flour.
- Contribution of cassava adhesive alone to plywood industry amounts to US$900,000 per annum.
- Offers employment for the youth.

ADHESIVES: **HIGH QUALITY CASSAVA FLOUR**

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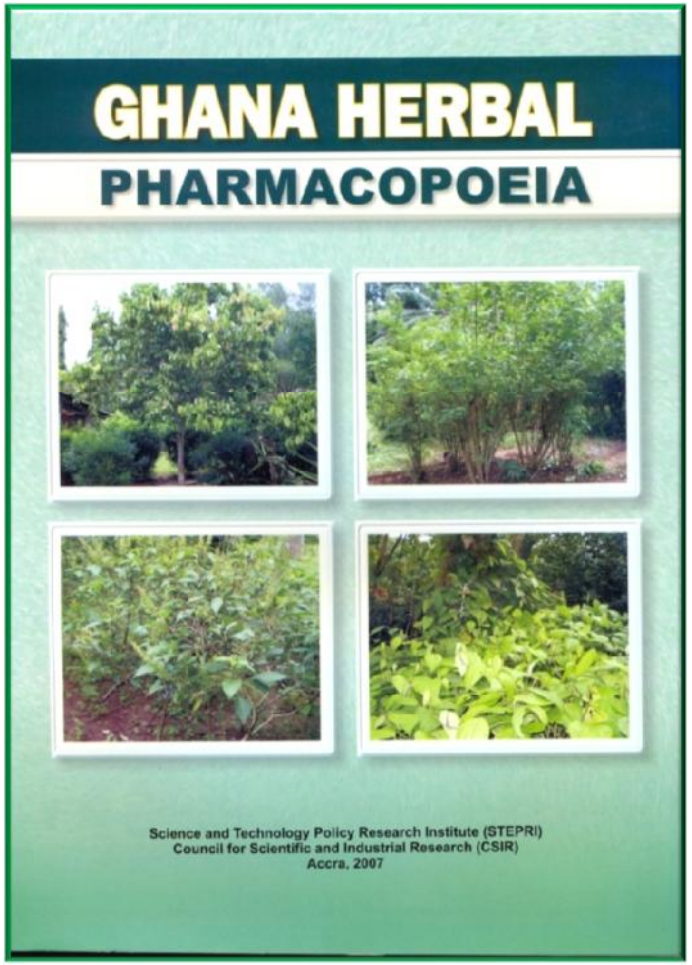
TRADITIONAL MEDICINE

- *"… Science without tradition can produce technicians but not cultured men; tradition without science can breed learned but not rational men"*
  - *Cyrus Gordon, 1968.*
- **Herbal Pharmacopoeia** to integrate traditional herbal medicine.



CROPS IMPROVEMENT

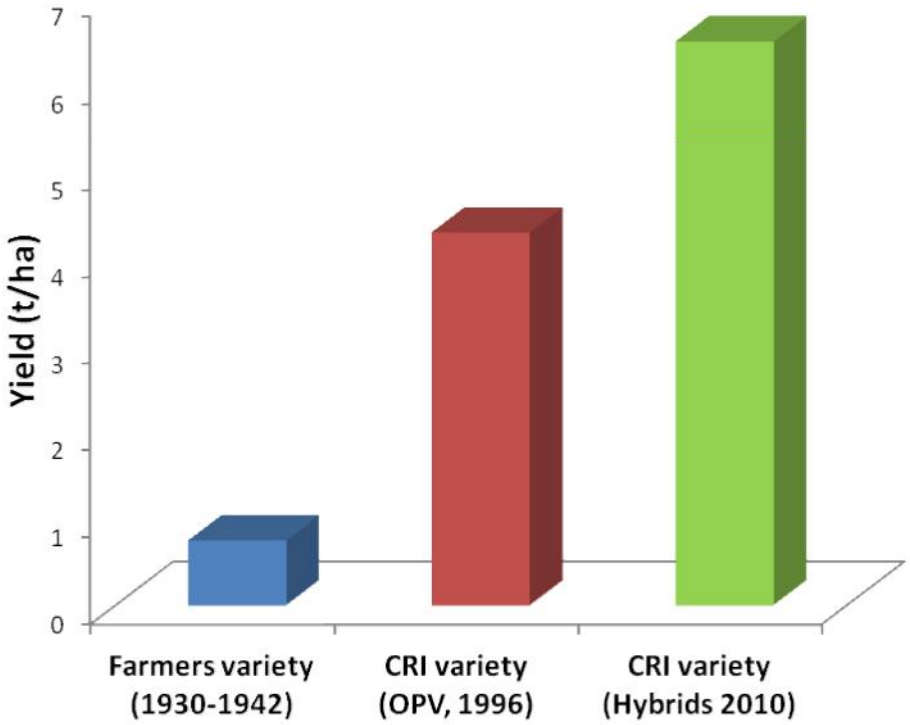


- **Varieties of crops spanning the Ghanaian staple spectrum:**
  - **Cereals: *Maize, Rice, Sorghum & Millet***
  - **Grain Legumes: *Cowpeas, Peanuts, Soyabean, etc.***

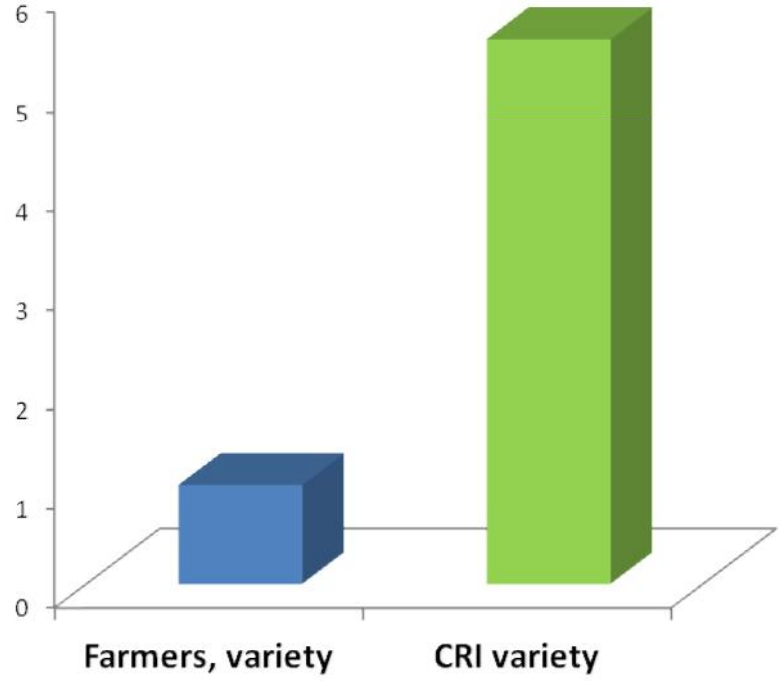
IMPROVED *versus* FARMERS' VARIETIES

IRR for maize = 70%

Maize



Rice



LIVESTOCK AND POULTRY

- **TECHNOLOGIES:**
  - **Least cost feed production using various agro-industrial by-products as feed for cattle and small ruminants.**
  - **Promotion of locally produced vaccines for livestock and poultry.**
  - **Technology for sustainable management of rangelands.**

FISH FARMING: *TILAPIA IMPROVEMENT AND PRODUCTION*

- **CSIR developed the improved "Akosombo Strain" of Nile Tilapia which grows 25-30% faster than the wild and other local stocks.**
- **This strain currently forms the backbone of freshwater aquaculture in Ghana, Ivory Coast and Mali.**
  - ***Production rose from 550MT in 2000 to over 27,000MT in 2012.***
- **CSIR produces over 5,000,000 fingerlings annually and over 30,000 improved brood stocks for supply to farmers annually.**

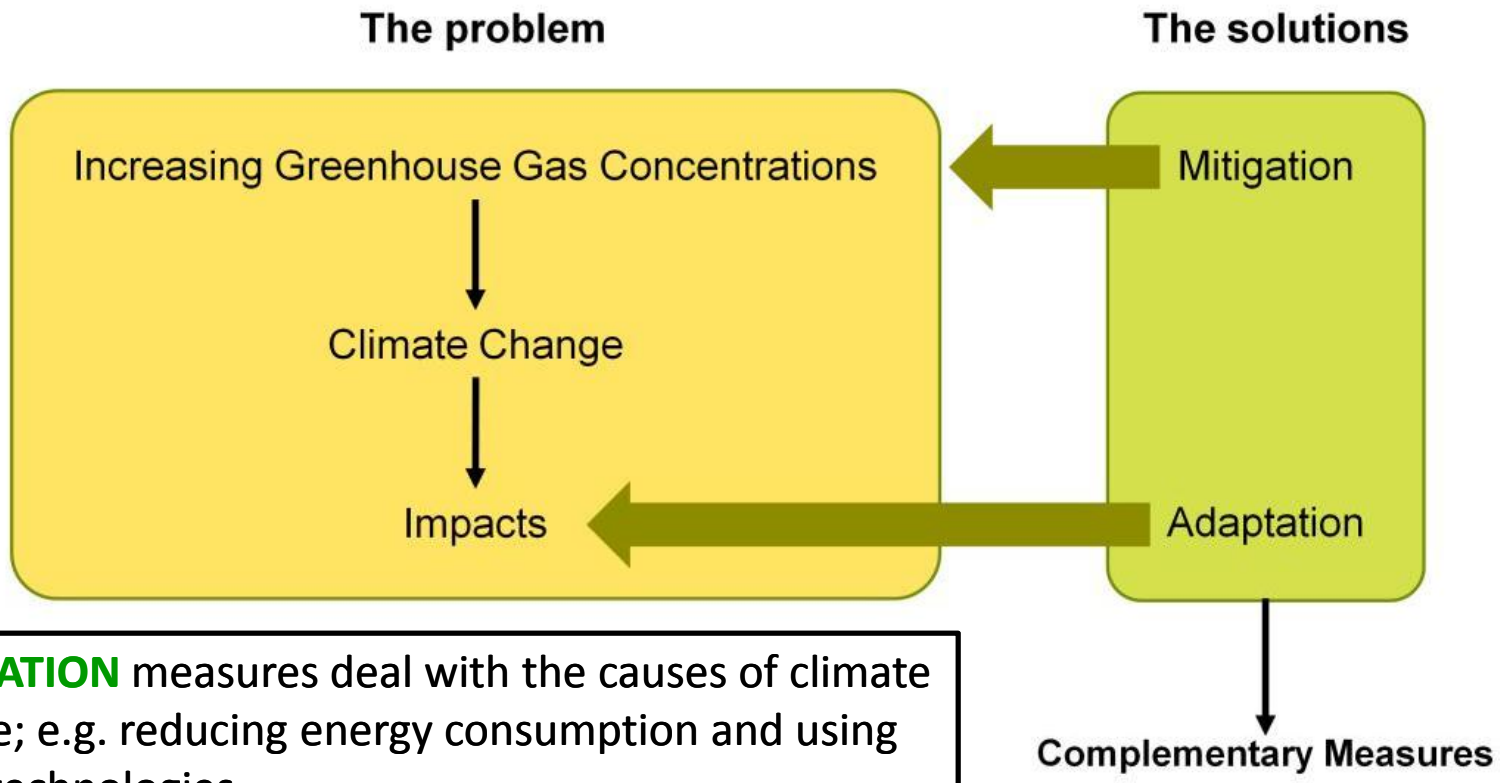
AGRO PROCESSING AND **VALUE ADDITION**

- **CSIR-Food Research Institute** has array of agro-processing/value addition technology.
- A number of commercial convenience foods in the Ghanaian and external market.

RECLAMATION OF DEGRADED MINE SITES FOR AGRICULTURE

- The concentration of heavy metals beyond acceptable limits in soils and food crops grown in galamsey communities render the crops poisonous to humans and wildlife.
- As a result, the CSIR-SRI has, through several years of pollution management studies associated with mining, developed simple and sustainable pollution management technologies that are able to transform such degraded environments into productive ecosystems.

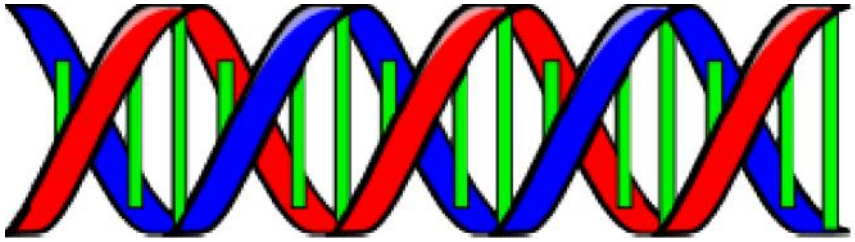
CLIMATE CHANGE -
MITIGATION AND ADAPTION



MITIGATION measures deal with the causes of climate change; e.g. reducing energy consumption and using clean technologies.

ADAPTATION measures deal with the impacts of climate change;
e.g. managing watersheds for reducing landslides or developing alert systems.

BIOTECHNOLOGY



- **PCR-based studies to enhance:**
  - *Marker Assisted Selection (MARS).*
  - *Introduce plant protection, yield and nutrient enhancing genes.*
- **Cognizant of cost to farmer of biotech products.**


THANK YOU