


# The contribution of international academic co-operation to ensure environmental sustainability: Best practice examples and international co-operation models between Brazilian and German universities and other institutions

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University of Applied Sciences of Cologne

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- Introduction
- Scientific - Technological Cooperation Germany – Brazil
- Project Atlantic Rainforest (Mata Atlântica)
- Trilateral Co-operation for Sustainable Management of Natural Resources
- Rio Cauto (Cuba)
- Lake Nasser (Egypt)

The Contribution of Higher Education Institutions to Poverty Reduction:
**Environment**

# ITT - Institute for Technology in the Tropics
# University of Applied Sciences of Cologne

International Master Course

"Technology and Resource Management in the Tropics and Subtropics"

Prof. Dr.-Ing. J. Roehrig




# Master Course Structure

| 30 Credit points | 30 Credit points | 30 Credit points | 30 Credit points |
|---|---|---|---|
| ***Preparatory*** • Language Courses | ***Core Courses*** • System Analysis • Environment Economics • International Cooperation | ***Application*** • Students Project • Team Work • Seminars | ***Concentration Area*** • Water Management • Land Use Systems • Sustainable Building • Renewable Energy | ***Individual Research and Master Thesis*** |

**Four Semesters**

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# Scientific - Technological Cooperation Germany - Brazil

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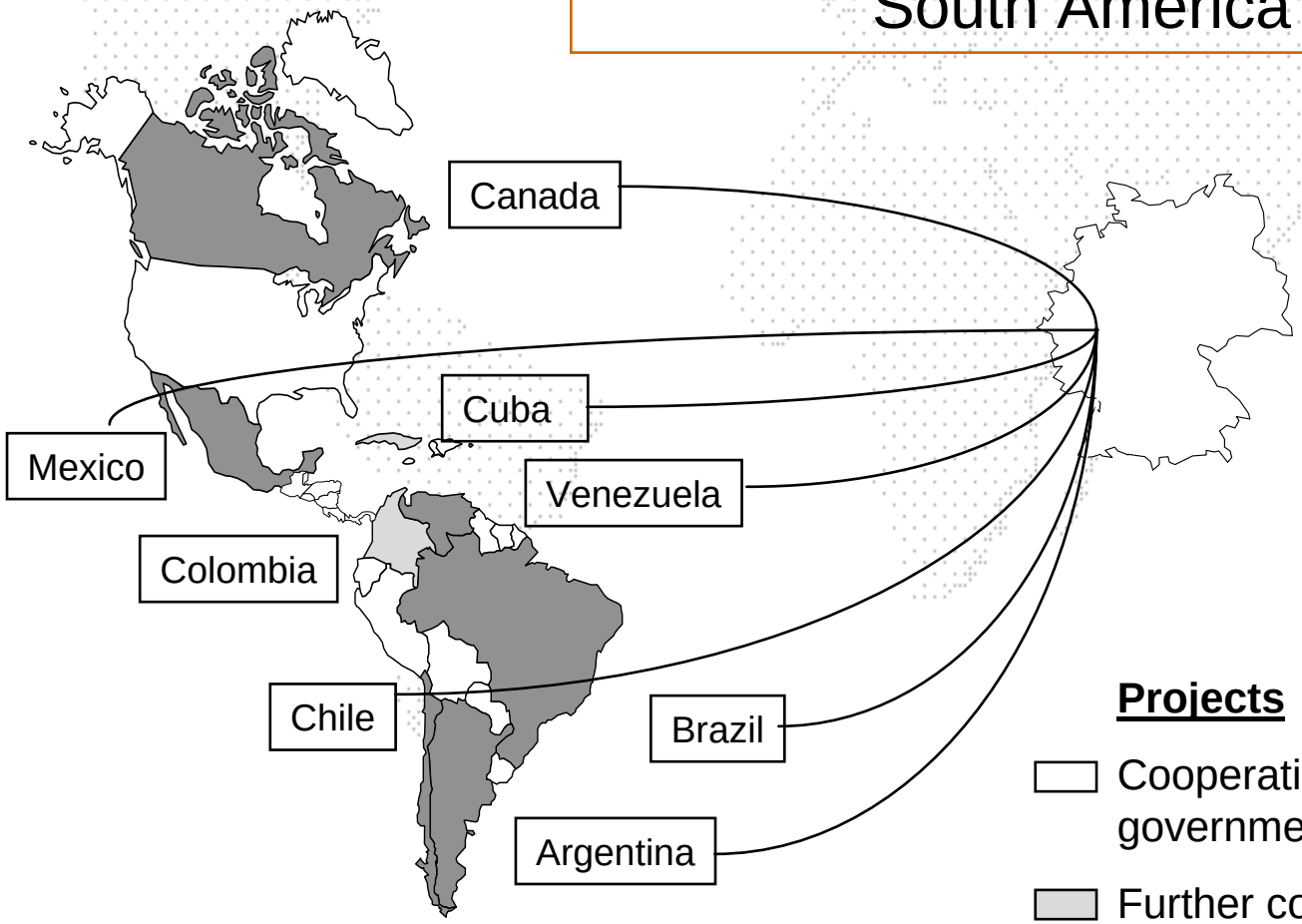
# Scientific - Technological Cooperation Partners between Germany and North / South America (2001)




**Projects**

- Cooperation within bilateral governmental agreements
- Further cooperation partners

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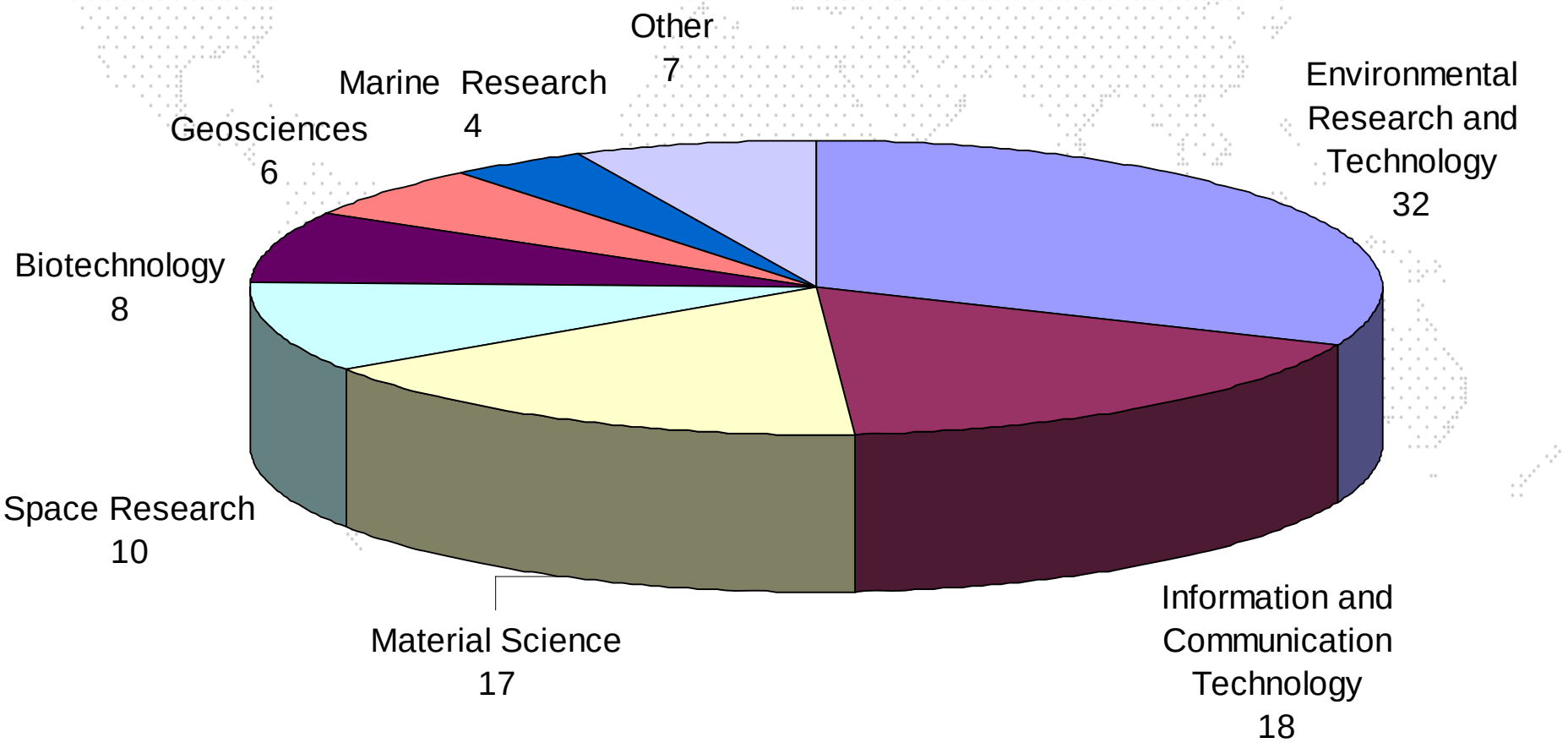
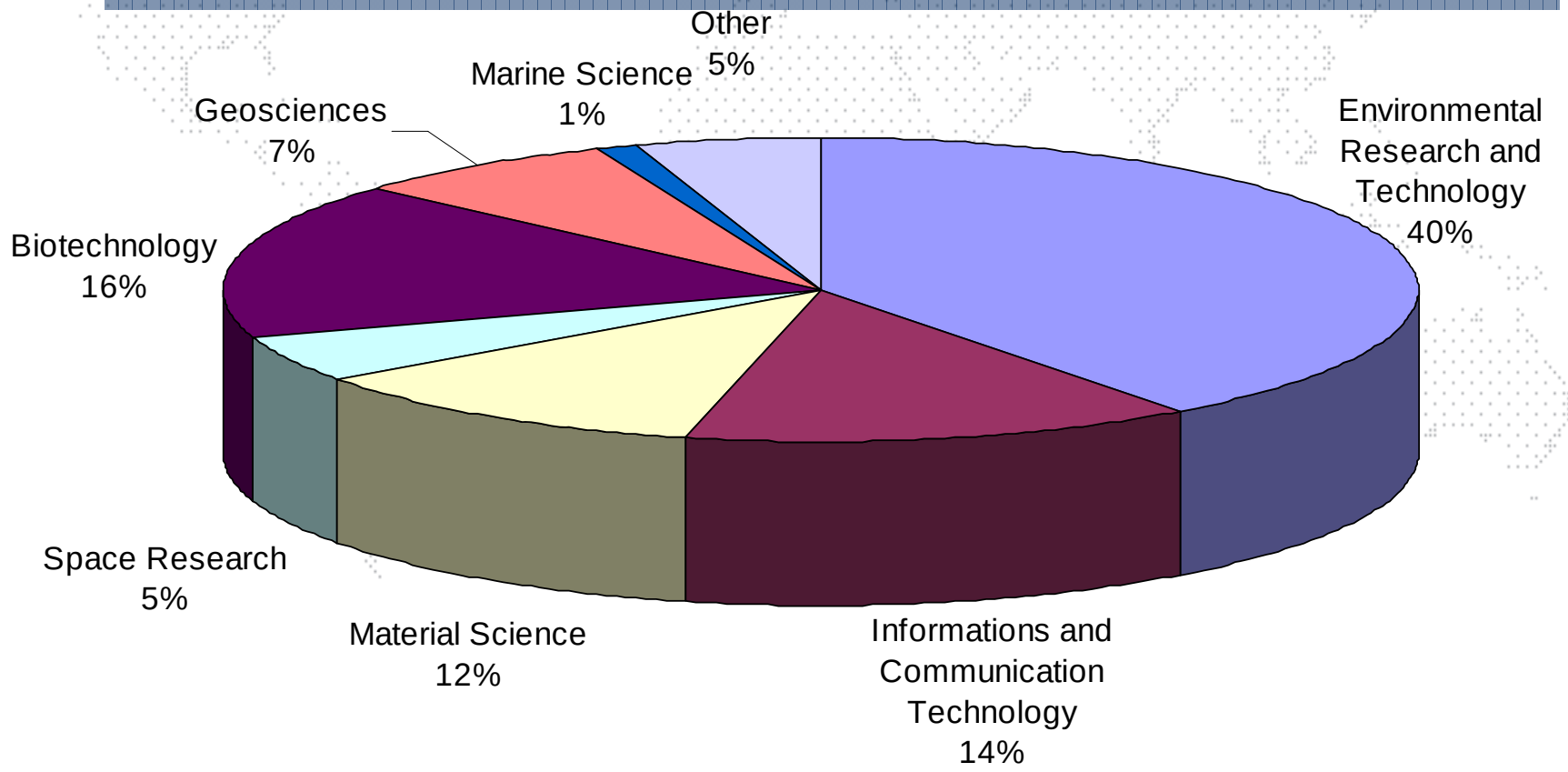
# Bilateral Projects: Research areas Germany - Brazil 2001
## (absolute numbers)



# Bilateral Projects: Project Costs Germany - Brazil 2001 (relative distribution)



# The Bilateral Working Group on Education funded on March 1998 in Brasilia

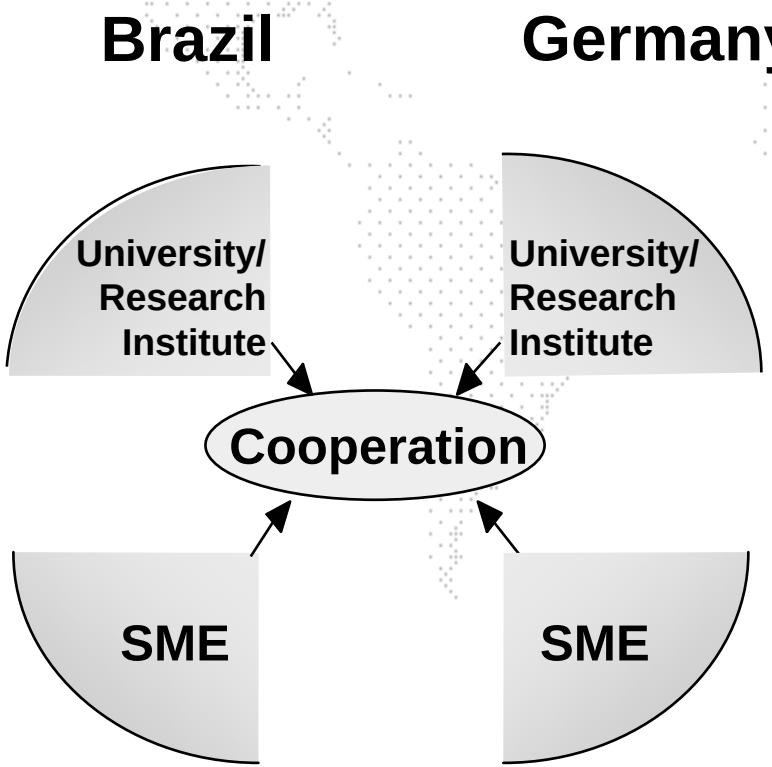
## Participating Institutions

| | |
|---|---|
| Germany | BMBF, AA, BMZ, BIBB, CDG, DAAD, DIHT/AHK, HRK, IB-BMBF, KMK |
| Brazil | MRE, MEC, CRUB, CAPES, CNPq, IEL, SENAI, FAPERGS, FAPESP, FINEP, INEP |

# Aims and Tasks of the Working Group

1. Exchange of information and experiences
2. Balance of exchanges and cooperative projects
3. Evaluation of existing projects and programs
4. Identify new possibilities for bilateral cooperation
5. Develop new ideas for future cooperation
6. Alternately meetings of working groups in Germany and Brazil

# Support for „2 + 2“ Projects




**Cooperation programs:**

- **support by DAAD, AvH, IB etc.**

**Interface between research and industrial use:**

- **support by Application Centers for technology transfer at universities etc.**

**Direct cooperation between enterprises:**

- **support by Chamber of Commerce Abroad etc.**

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# **B**iodiversity in Integrated **L**and **U**se Management for **E**conomic and **N**atural System Stability in the Mata Atlântica of Rio de Janeiro, Brazil

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# Brazilian Partners

Universidade do Rio de Janeiro

Instituto Nacional de Tecnología

Instituto Agronômico de Campinas

Universidade Federal do Rio de Janeiro

Instituto Oswaldo Cruz (FIOCRUZ)

Universidade Federal Rural do Rio de Janeiro

Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis (IBAMA)

# German Partners

Institute for Technology in the Tropics (ITT), University of Applied Sciences Cologne

Institute for Botany and Botanical Garden, University of Leipzig

Institute for Horticulture, University of Bonn

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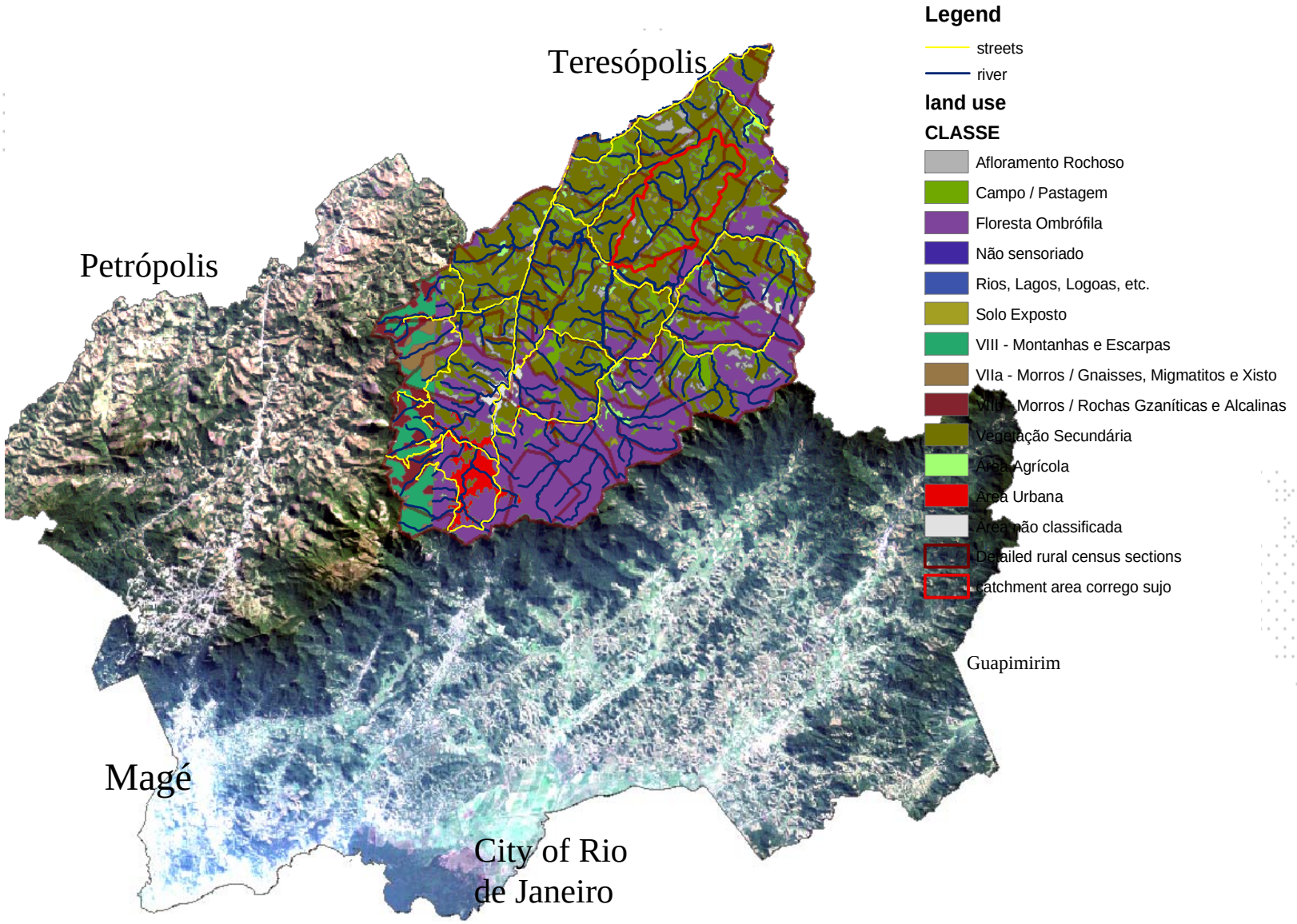


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# Problem Identification

Progressive expansion of human settlement, agricultural land use and tourism development

Inappropriate production systems (slope, soil, buffer areas, intensities)

Fragmentation of the Atlantic Rainforest

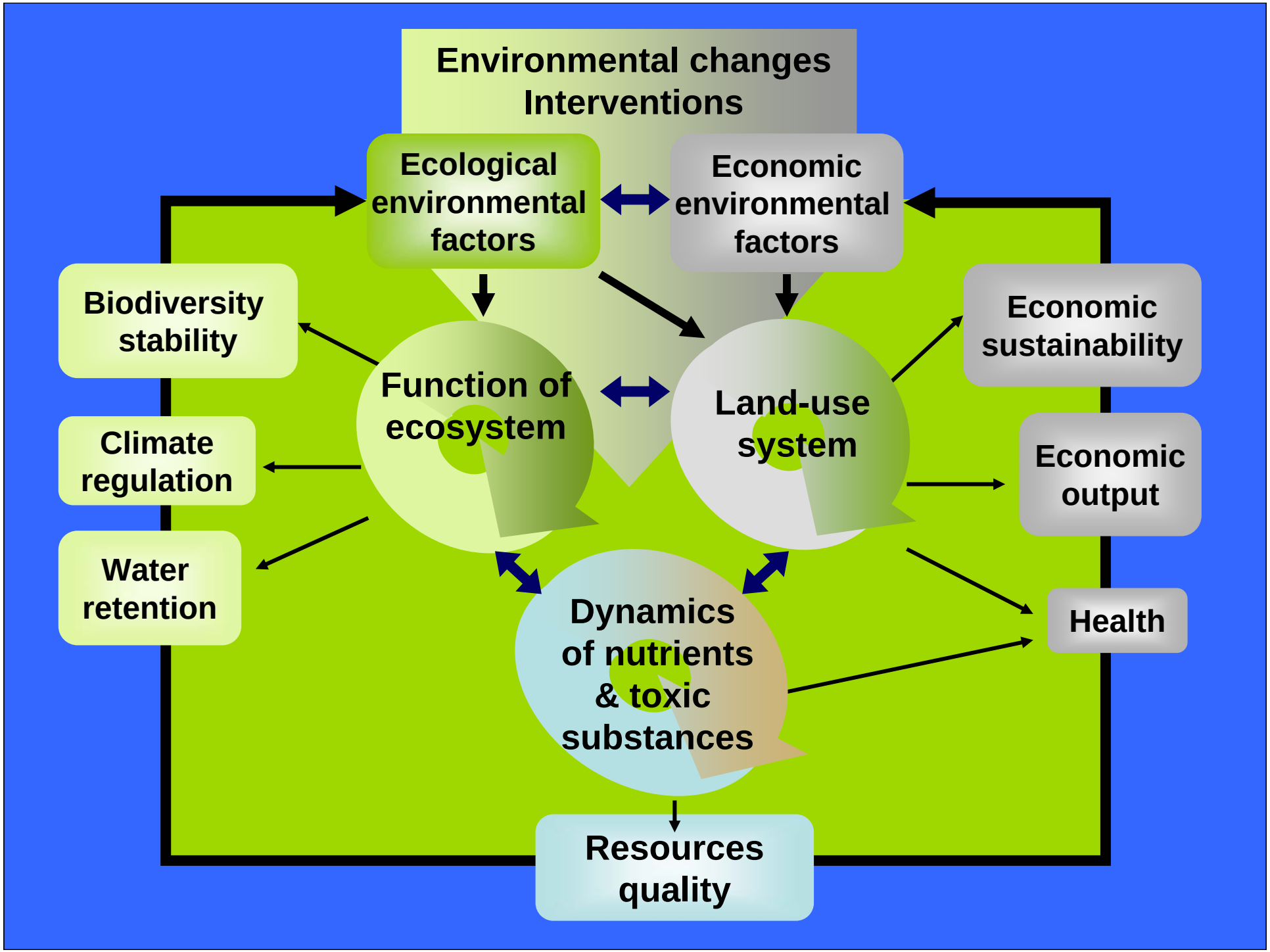
Excessive water use and contamination

Conflicting individual and community interest

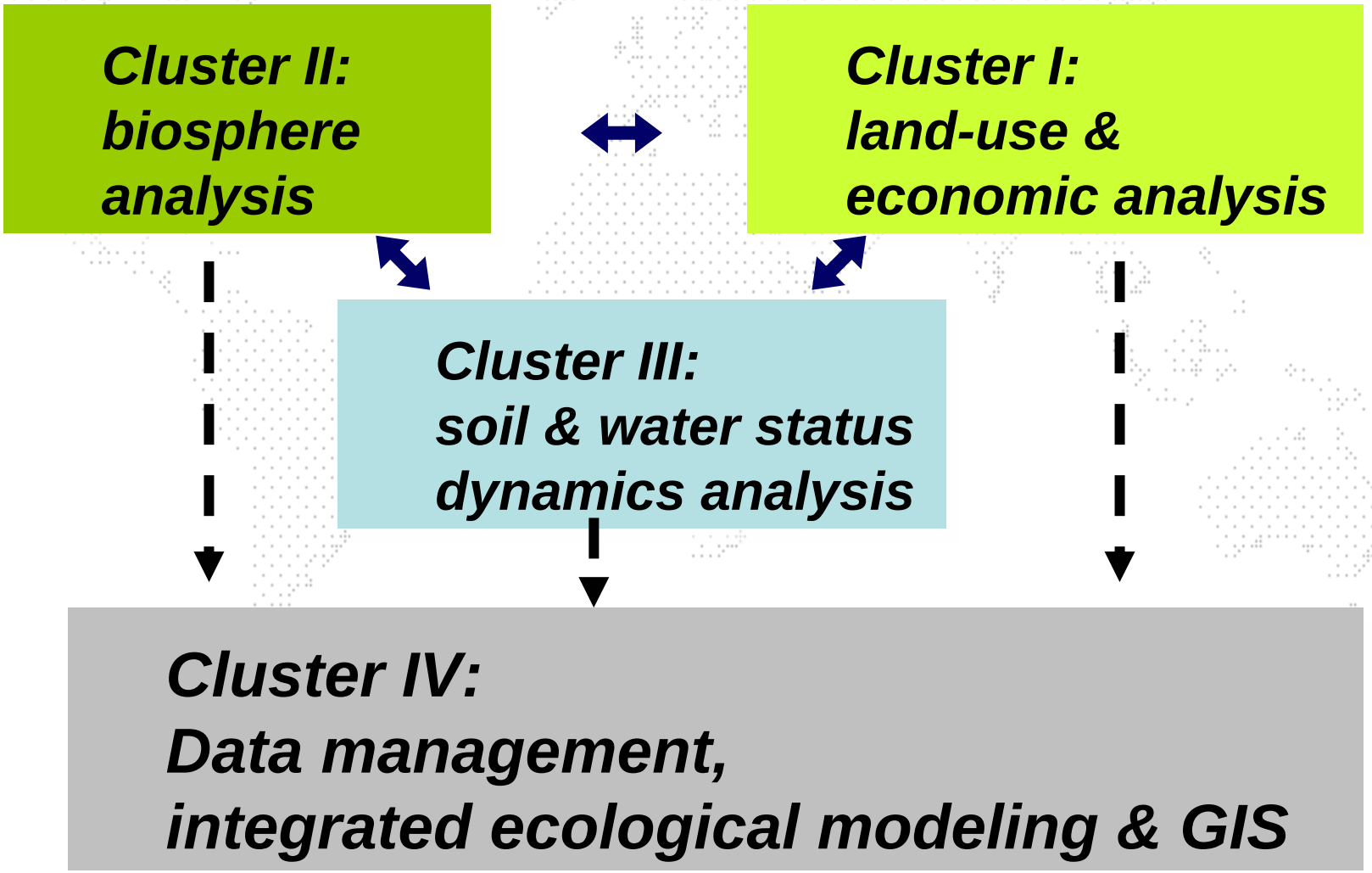
Conflicting ecological and economic development objectives

# Goal

- **Development of an assessment framework for decision-making for regional development under multiple objectives**
  - **Translate objectives of decision makers into the scientific problem**
  - **Quantify economic and ecological effects of agricultural practice and preservation strategies**
- **Participative concepts for corridor planning and management**


Environmental changes
Interventions
Ecological environmental factors
Economic environmental factors
Biodiversity stability
Function of ecosystem
Land-use system
Economic sustainability
Climate regulation
Economic output
Water retention
Dynamics of nutrients & toxic substances
Health
Resources quality

# Research Structure



# Trilateral Cooperation for Sustainable Management of Natural Resources

- **DAAD** Partnership Program for Sustainable Management of Natural Resources
- USP (Brazil), (UCV) Chile and (ITT) Germany
- Resulted from demands on internationalization of master courses and quality improvement of lectures as well as from former research projects and invited lecturers

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# Trilateral Cooperation for Sustainable Management of Natural Resources

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# Trilateral Cooperation ITT/UCV/USP Goals

1. Common development of lectures;
2. Extension of topics of concern covered by master courses;
3. Quality improvement of lectures through common evaluation;
4. Innovative solutions for teaching, research, services providing and consulting;
5. Institutional building through organizational exchange;

   …




# Trilateral Cooperation ITT/UCV/USP Goals

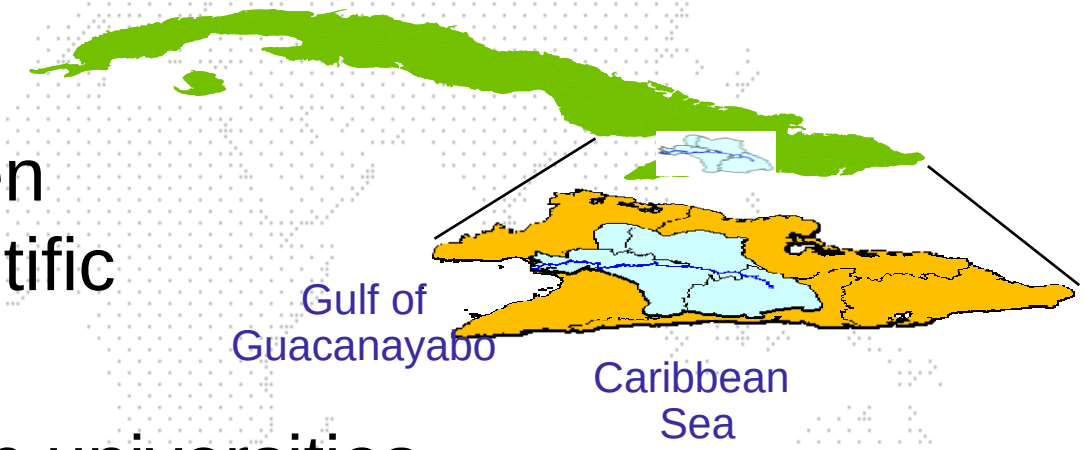
6. Improvement of international skills of staff and students;
7. Increasing experience in international cooperation for staff and students;
8. Building of an experts network;
9. South-south and north-south technological transfer;
10. Establishment of a long term cooperation and program continuity




# Trilateral Cooperation for Sustainable Management of Natural Resources

- Lectures attendance at partner universities;
- Development of master thesis at partner universities;
- Practices in partner countries;
- Common curriculum development;
- Associated professors at partner universities;
- Development of long distance courses;
- Network building;
- Preparation of new cooperation projects
- Organization of symposia, workshops;
- Technology transfer

# Rio Cauto (Cuba)




- Example of a partnership between technical and scientific cooperation
- Cuban and German universities
- GTZ (in cooperation with DED, DSE and CDG)
- Cuba government
- Stopped due diplomatic circumstances

# Rio Cauto – problem identification

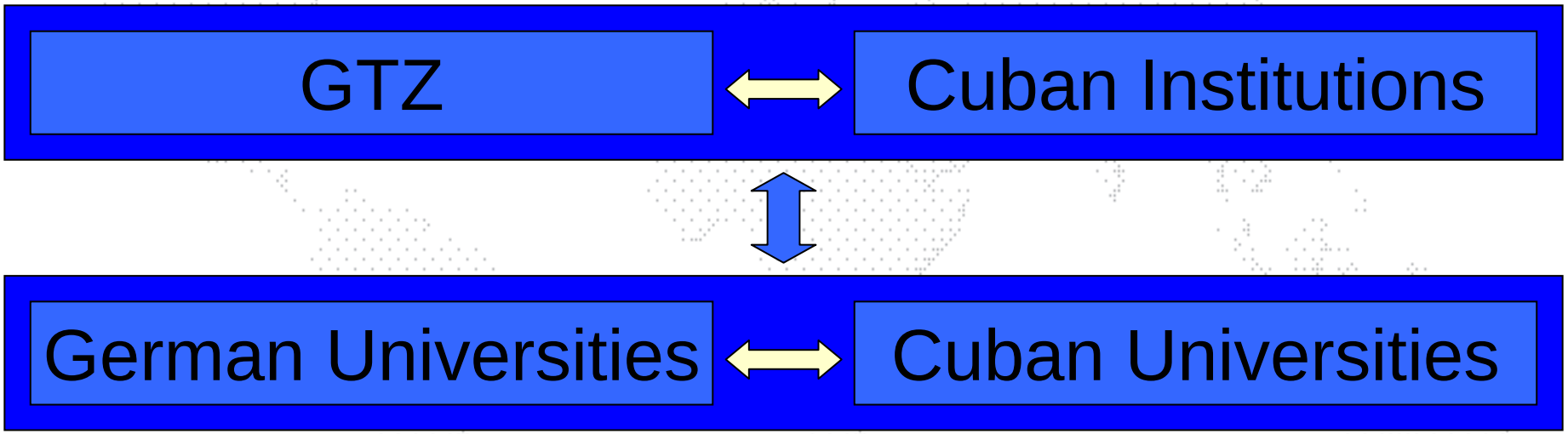
- Deforestation
- Water pollution
- Drinking water distribution
- Wastewater treatment
- Soil degradation
- Environmental awareness
- Risk to the biodiversity

# Rio Cauto – problem identification

# Rio Cauto – GTZ Project

- Rio Cauto Watershed Management
- Duration: 12 years
- Stopped due diplomatic problems between Europe and Cuba

# Rio Cauto – planed 2 +2 partnership

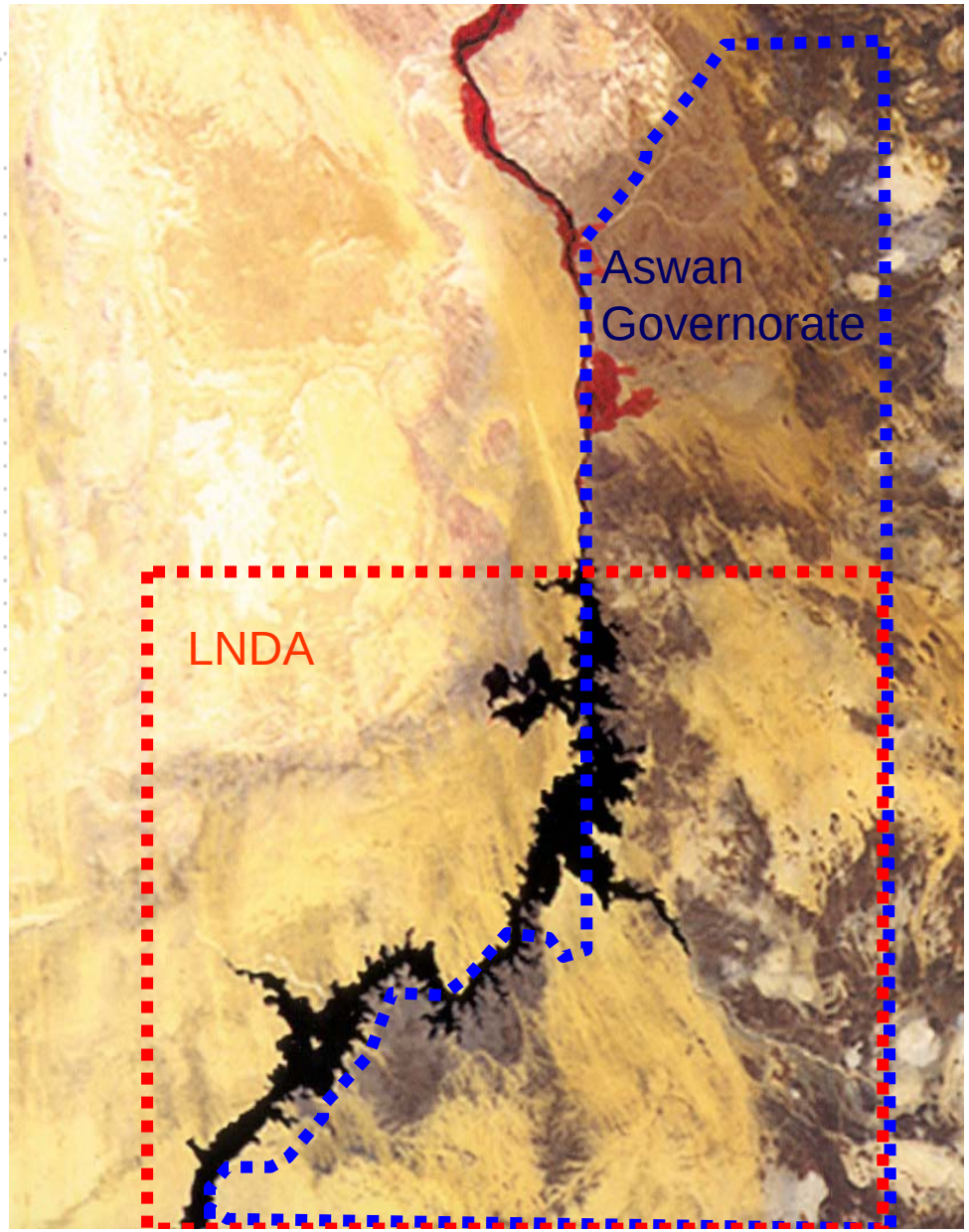



Research topics according to the demand established by GTZ / Cuban institutions

Agreement between BMZ and BMBF

# Lake Nasser Project Egypt

- Urban and rural development in the desert region around the Lake Nasser
- Settlement Program in the Lake Nasser Region under the Guidance of Lake Nasser Development Authority (LNDA)






## Backgrounds for the Lake Nasser New Communities

- Population Pressure 2,9 % Increasing/Year
- low or no development oportunities in the Nile Valley

## Vision 2017 and later

- 1,5 Millions settlers in the next 20 Years
- ~ 6 Millions Settlers in the next > 50 Years
    - 4 Main Development Directions
        - Agriculture
        - Fishery
        - Industry
        - Tourisms

## Imperatives

- **The lake should stay clean!**
- **Development needs to be long term ecologically sustainable**:
  - Biological fertilizer
  - Biological Plant protection,
  - Waste prevention.
  - Waste recycling.
  - Reuse of water should be as high as possible
  - Use of energy saving systems (SDHW, SHS, PV, Wind)
- **Development should be laid out for job and living development .**
- **Developmet of work places with the least amount on imports with the highest amount of exports should be aimed for.**




## Problem : Sustainable Resource Use

# Ecology

- Ecosystem around lake Nasser
- Water quality in Lake Nasser
- Scarce water resources
- Fragile desert-ecosystem

# Economy

- Settlement expansion
- Expansion of the agricultural production
- Expansion of fish production
- Expansion and growth of the coupled sectors (near and far)

## Research Objectives

# Optimizing water resource use, cycling nutrients, settlement planning and energy optimization under a multiple use concept

**Tools:**

- **Development of an integrated model village (optimized resource cycling and protection)**
- **Continuous environmental monitoring for optimizing water technologies in integrated production systems (Fish, Animals, Plant Production) within the context of settlements**
- **Agro-ecological, social and cultural research in settlement development**




# Activities

## Phase 1: Facts and Modeling (Year 1-3)

- System analysis
- Resource flow and cycle analysis
- Resource budgeting and allocation
- Rural Landscape analysis
- Scenario development
- Subsystem testing

## Phase 2 : Technology Development

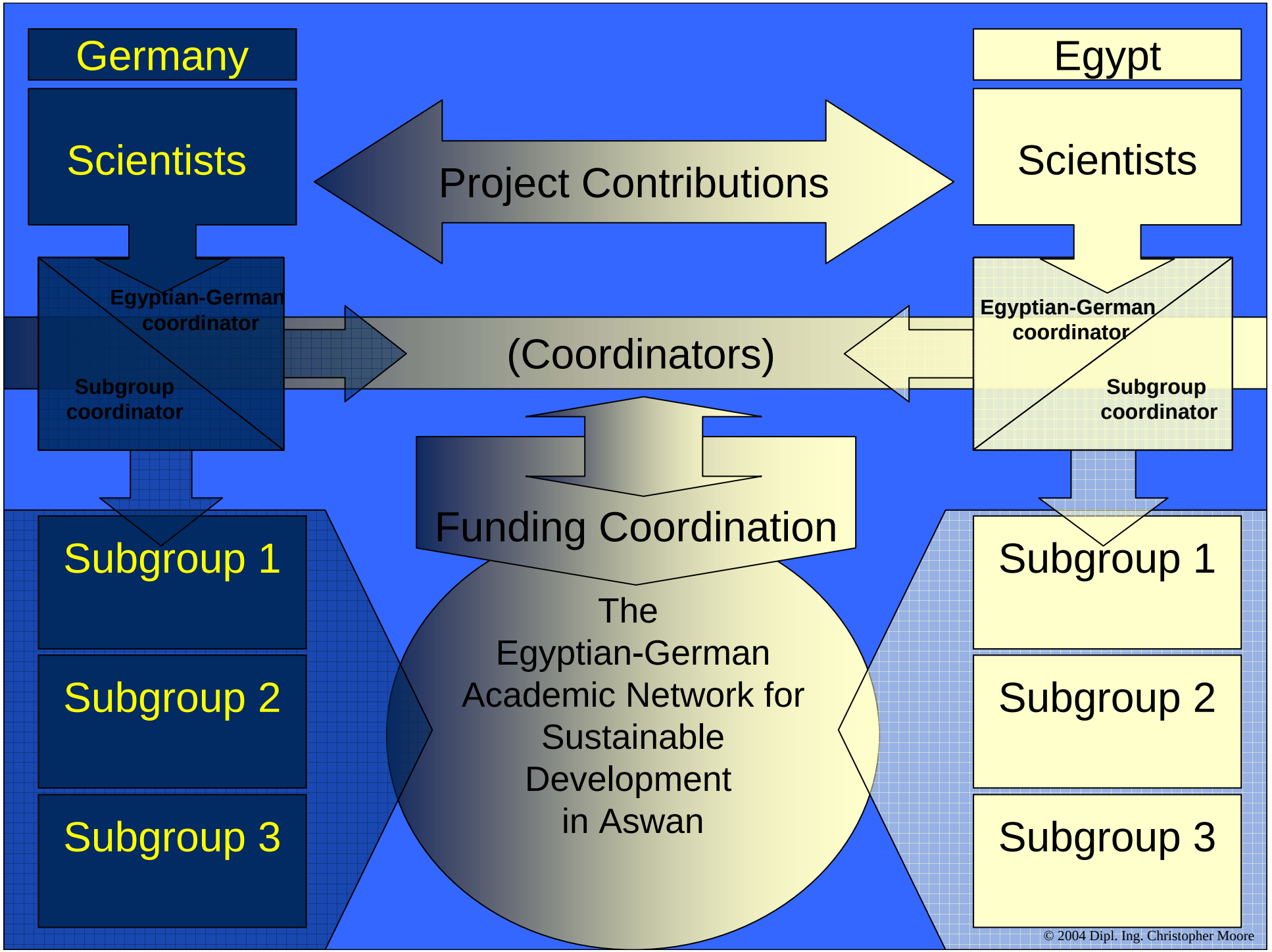
**Pilot Application in on station model village**

**1. Fish-Animal-Plant Integration**

**2. Settlement, Energy, Water and Waste**

## Phase 3: Technology Development

**Full-scale application and implementation**


Germany
Egypt
Scientists
Project Contributions
Scientists
Egyptian-German coordinator
Subgroup coordinator
(Coordinators)
Egyptian-German coordinator
Subgroup coordinator
Funding Coordination
Subgroup 1
Subgroup 2
Subgroup 3
The Egyptian-German Academic Network for Sustainable Development in Aswan
Subgroup 1
Subgroup 2
Subgroup 3
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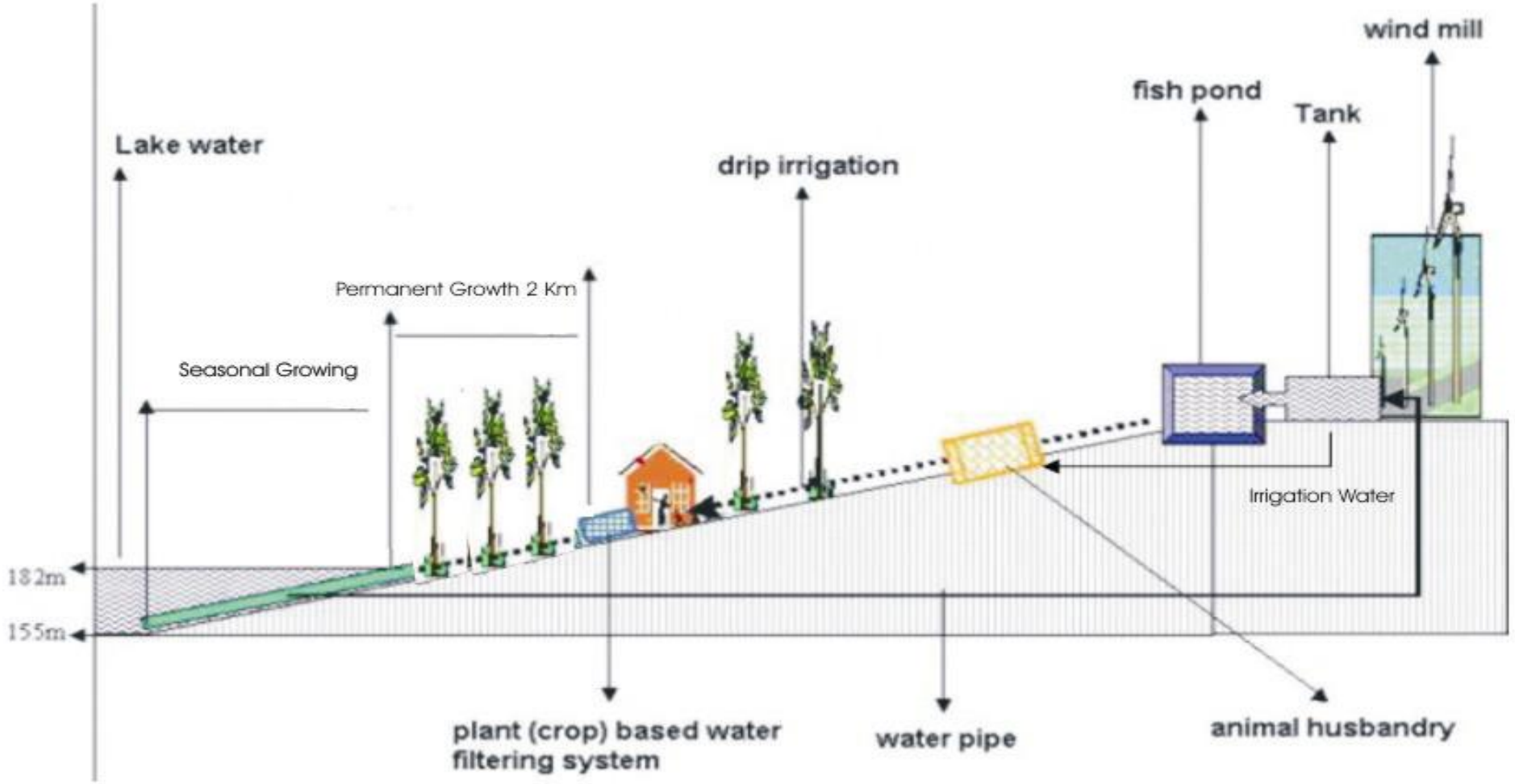
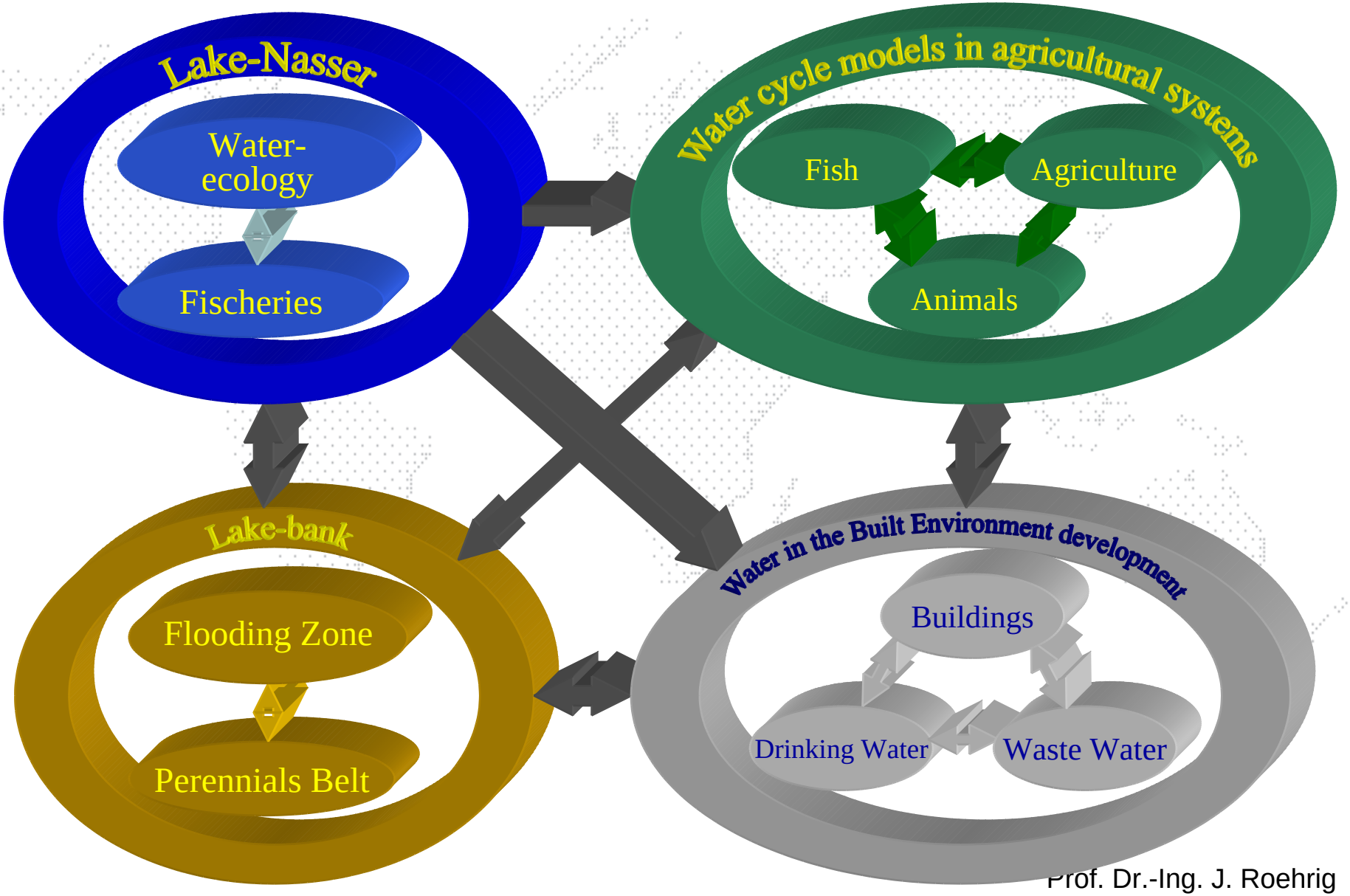
# Cross-section Lake Nasser Settlement



# The Contribution of Higher Education Institutions to Poverty Reduction: **Environment**

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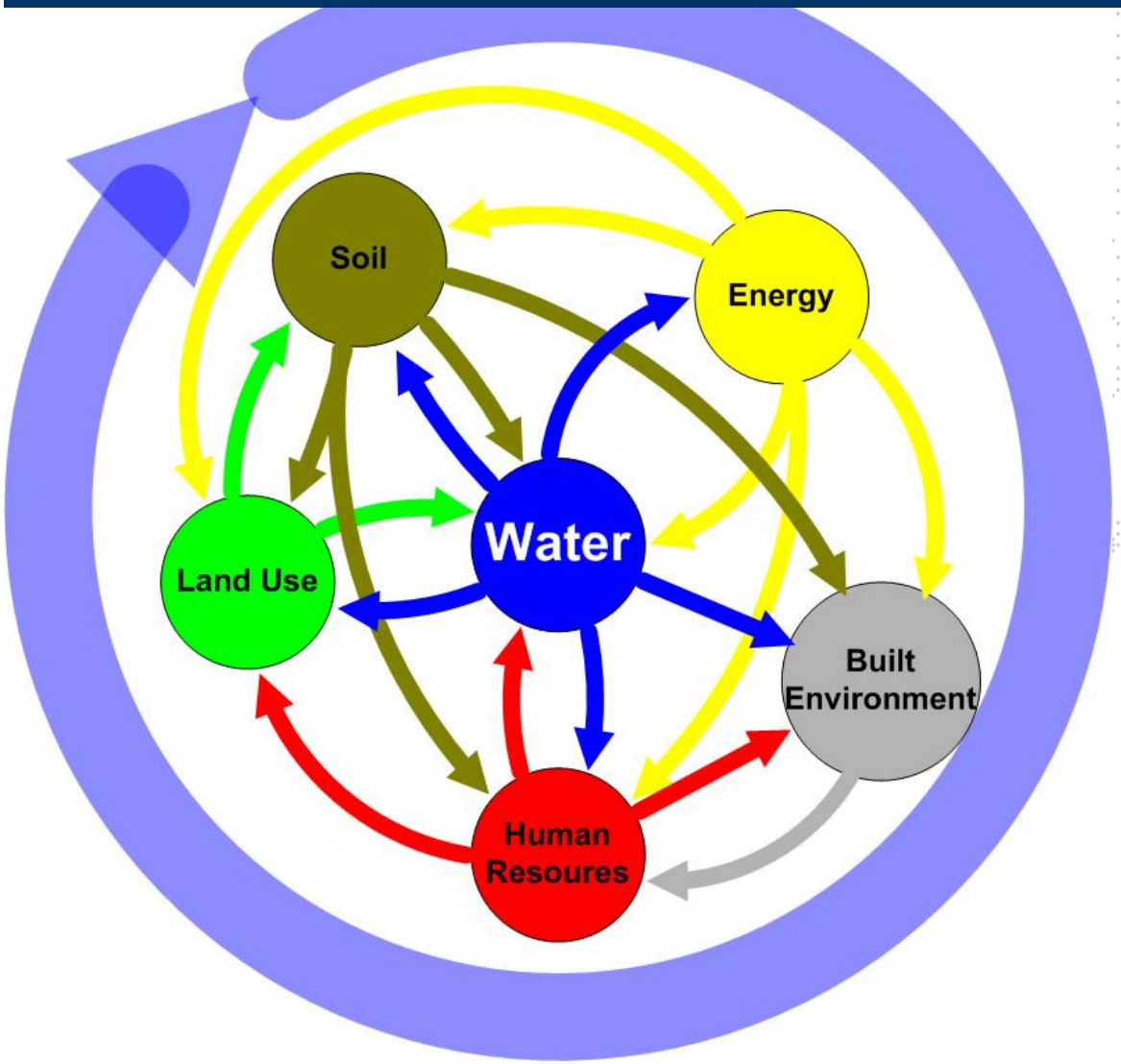
# Resource Flows




**Water**
- Potable Water
- Energy Generation
- Irrigation
- Water in buildings

**Energy**
- Human Live
- Processing
- Agro-technology
- Water regulation
- Development of water resources

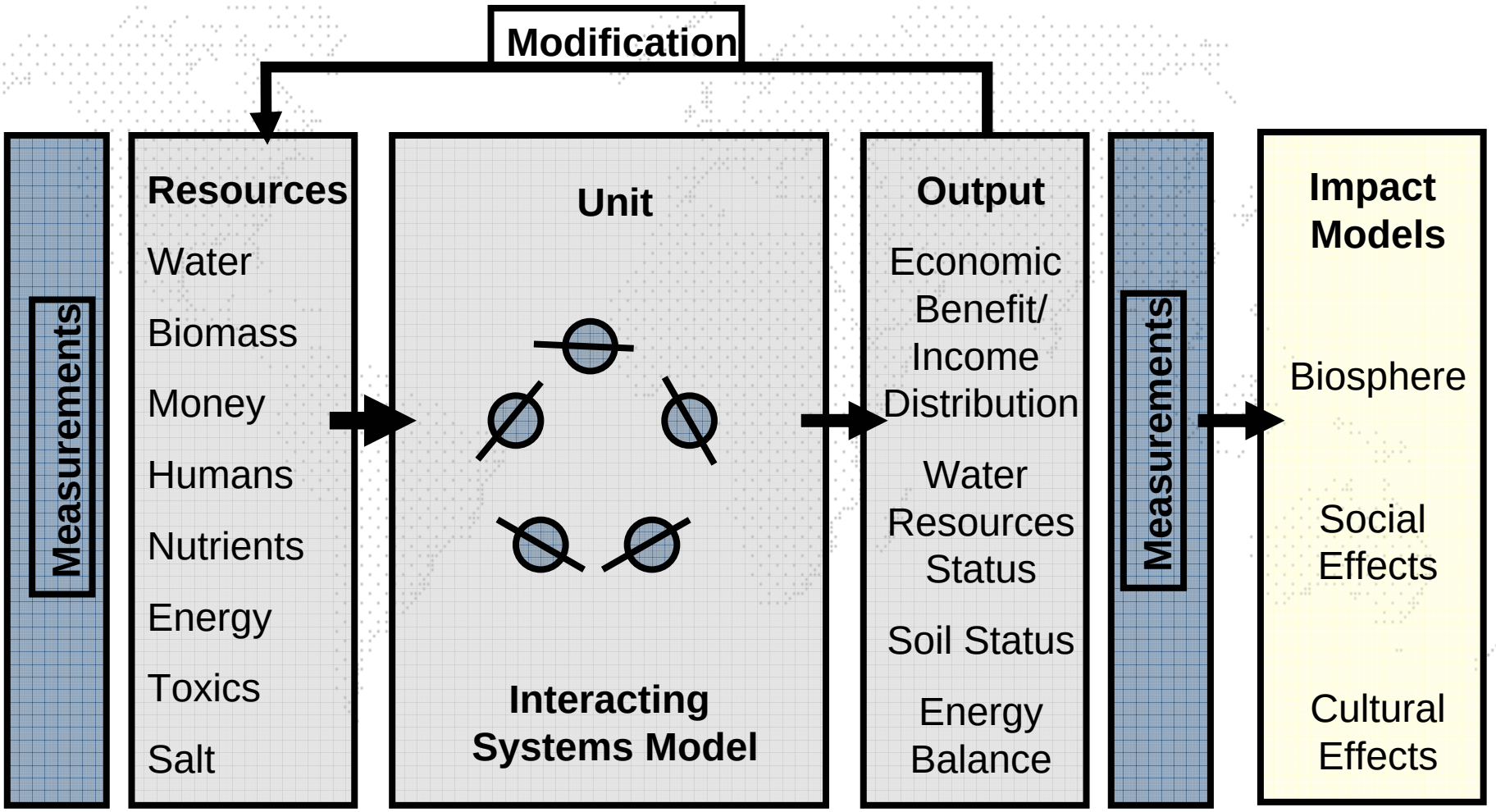
**Soil**
- Agro-land use
- Food provision
- (Construction)
- Water retention

**Built Environment**
- Housing/Living
- Storage
- Transport
- Processing

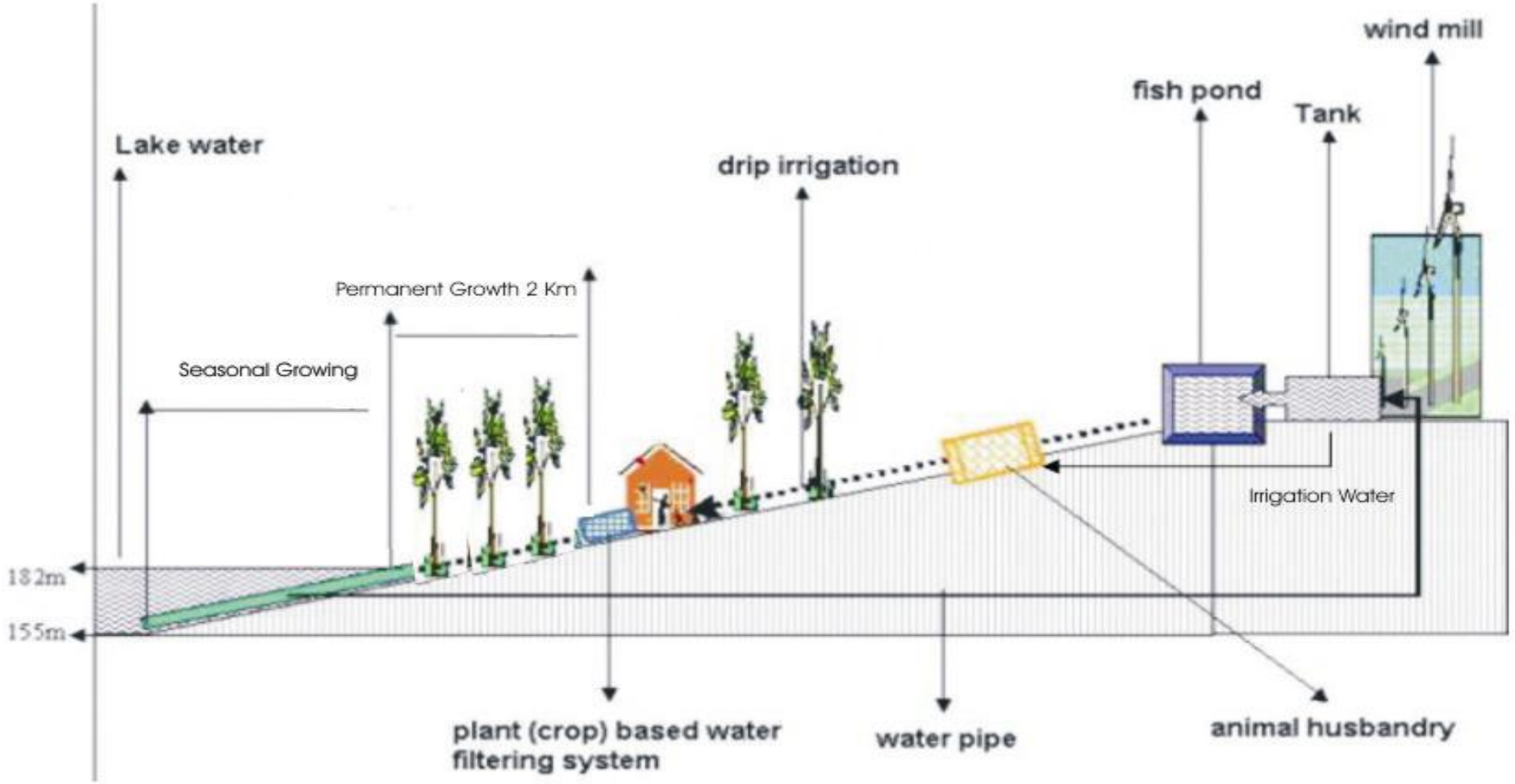
**Land Use**
- Food provision
- Water retention

**Human Resources**
- Farming
- Industry
- Construction
- Water supply

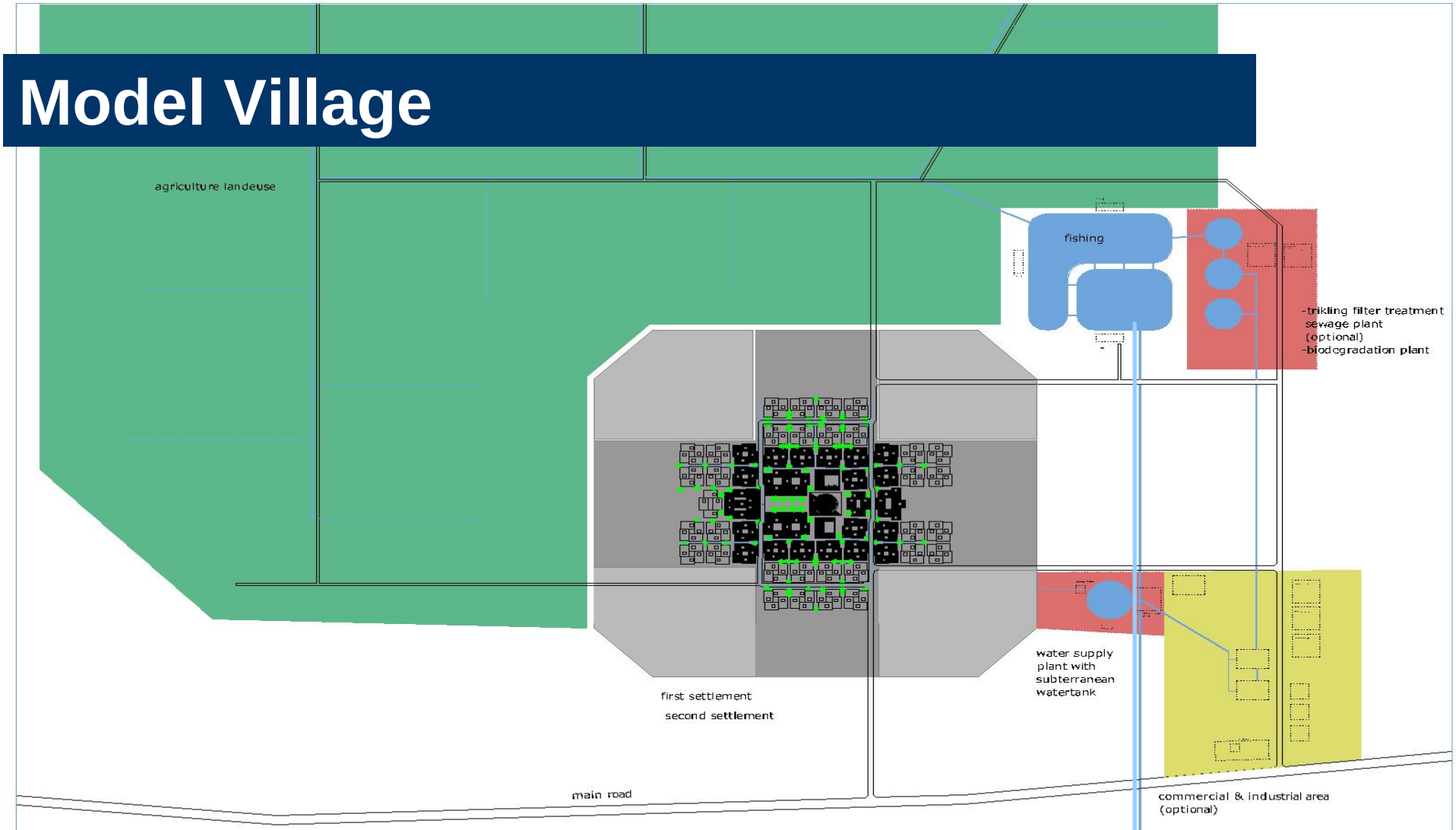
# System Design (within the phases)



# Cross-section Lake Nasser Settlement



# Model Village




Forest Strip 2000 m (not to scale)

Fore-shore Agriculture

Lake Nasser

# Details of Model Village