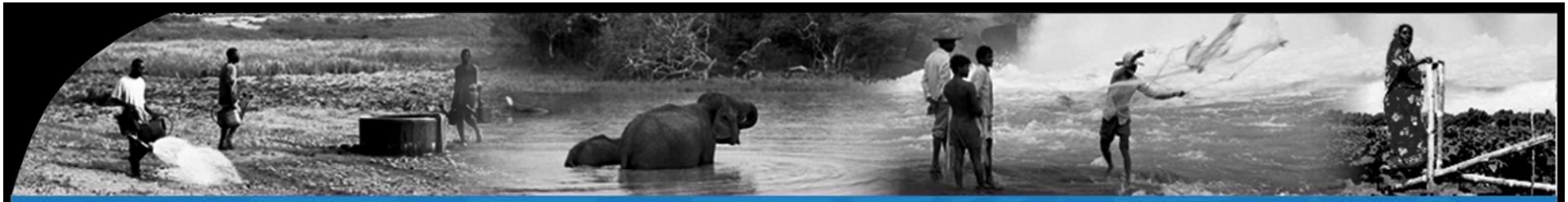


K & C Science Team meeting, January 2008

Lisa-Maria Rebelo
International Water Management Institute

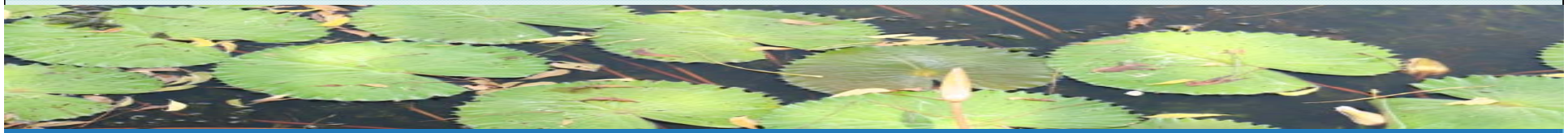
The International Water Management Institute:

A non-profit scientific research organization focusing on the sustainable use of water and land resources in agriculture and on the water needs of developing countries.

IWMI works with partners in the South to develop tools and methods to help these countries eradicate poverty through more effective management of their water and land resources.

Basin Water Management*, *Land, Water and Livelihoods*, *Agriculture, Water and Cities*, *Water Management and Environment

- **Irrigated area mapping**
- **Hydrological and environmental flow analysis**
- **Global wetland inventory and mapping**
  - **Collaboration between IWMI, Ramsar and WI**
  - **Mapping of globally significant wetlands to improve environmental protection and sustainable management**
  - **Support the information needs posed by the Ramsar Convention on wetlands**
  - **Focus on "prototype areas" - Africa**



Improving water and land resources management for food, livelihoods and nature

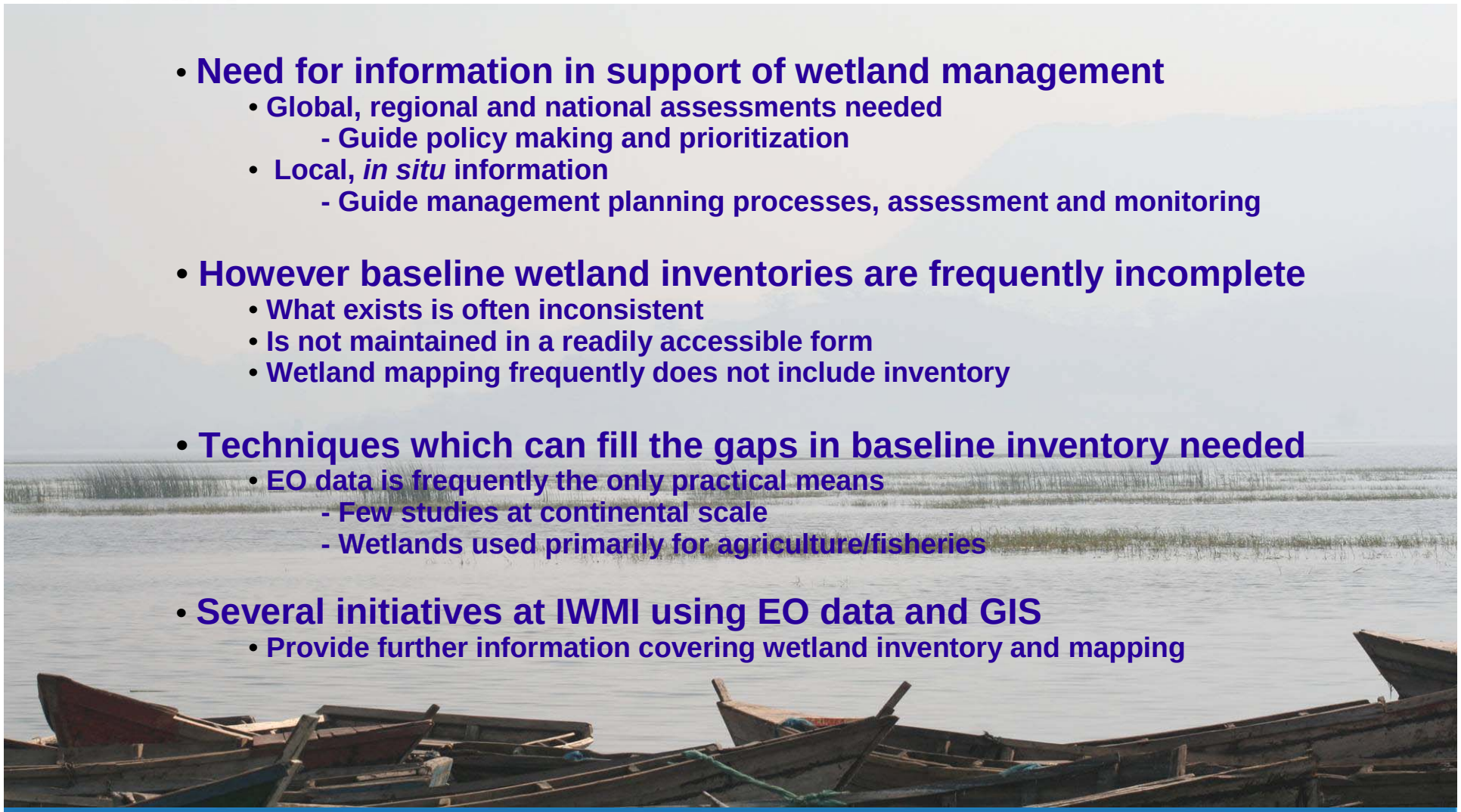
Global wetland mapping and inventory at IWMI

- **Need for information in support of wetland management**
  - **Global, regional and national assessments needed**
    - **Guide policy making and prioritization**
  - **Local, *in situ* information**
    - **Guide management planning processes, assessment and monitoring**

- **However baseline wetland inventories are frequently incomplete**
  - **What exists is often inconsistent**
  - **Is not maintained in a readily accessible form**
  - **Wetland mapping frequently does not include inventory**

- **Techniques which can fill the gaps in baseline inventory needed**
  - **EO data is frequently the only practical means**
    - **Few studies at continental scale**
    - **Wetlands used primarily for agriculture/fisheries**

- **Several initiatives at IWMI using EO data and GIS**
  - **Provide further information covering wetland inventory and mapping**



Mapping, inventory and assessment of global wetlands

Acknowledging the shortcomings in existing inventories:

- Lack of accurate and reliable global and continental assessment
- Recognition of many ongoing efforts to address this at various scales

WSSD Type II partnership for global wetlands mapping and inventory:

- Proposed by IWMI and FAO
- Accepted by Ramsar's STRP

The aim of the partnership is to:

- Harmonize activities globally in support of Ramsar and other biodiversity-related conventions
- Provide support and introduce coherence to global wetland mapping efforts
- Provide a foundation for an accurate global assessment and inventory

The focus of the partnership will be:

- Capacity building at the national to regional level
- Development of standards, protocols and methods
- Development of a standardized wetland classification system

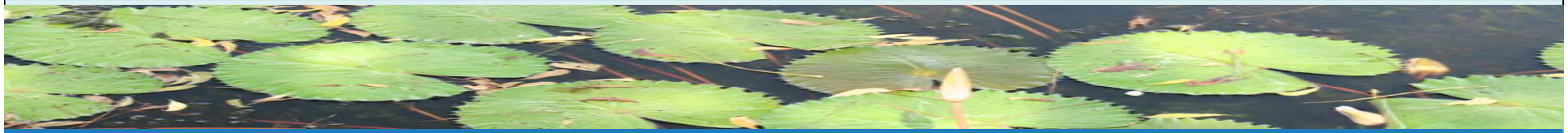
K&C activities & PALSAR data
Spatial Inundation mapping:

Mapping of the spatial and temporal characteristics of seasonal inundation:

- 2 major African basins
- Zambezi and Nile
- ➢ seasonal inundation maps

Multiple scale analysis of wetland areas within these basins

- individual Ramsar sites
- assess scenarios for changes in inundation patterns
- assess potential impact of river regulation

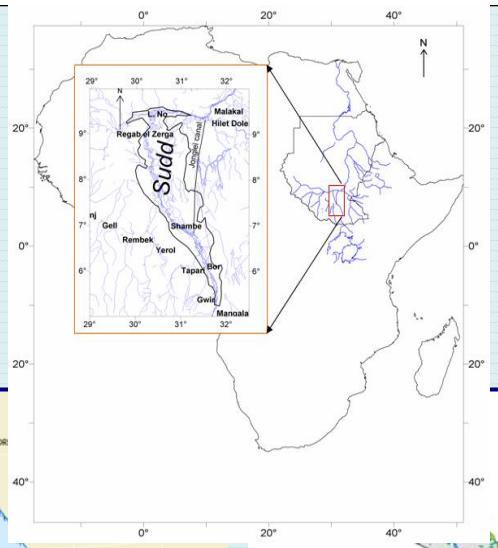


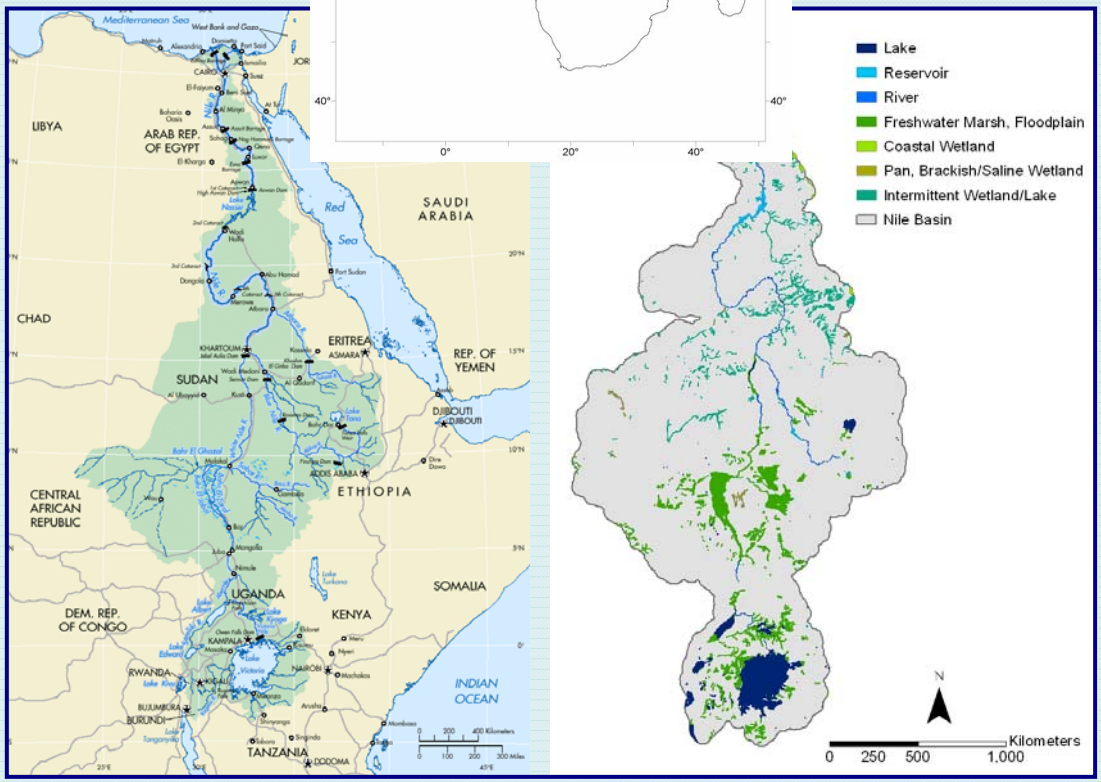
The Nile Basin:

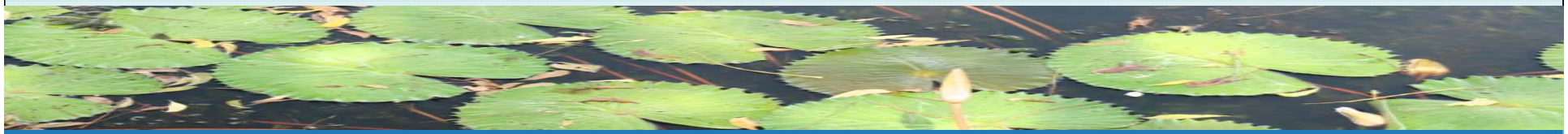
- Extensive wetlands and floodplains
  - -depend on flooding
  - -fisheries, recession ag, grazing
- Dams decrease flood benefits
- 8 dams are planned in Ethiopia alone

- Quantifying downstream impacts:
  - spatial extent of flooding
  - temporal dynamics
  - habitat and ecological zones

- The Sudd Wetland
  - 40,000km^2
  - long civil wars, prolonged instability
  - Jonglei canal
  - little is known about the Sudd







Improving water and land resources management for food, livelihoods and nature

The Upper Nile Basin:

“Safeguarding floodplain and wetland based livelihoods through effective water management in the White Nile Basin”

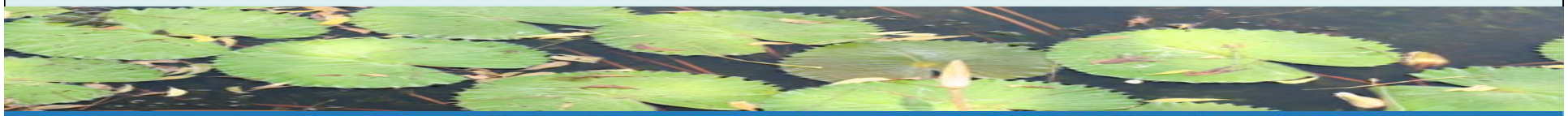
- impacts of increased water resources development on downstream ecosystems
  - flood dynamics in the White Nile
  - Sudd wetland

Spatial patterns of inundation over a year

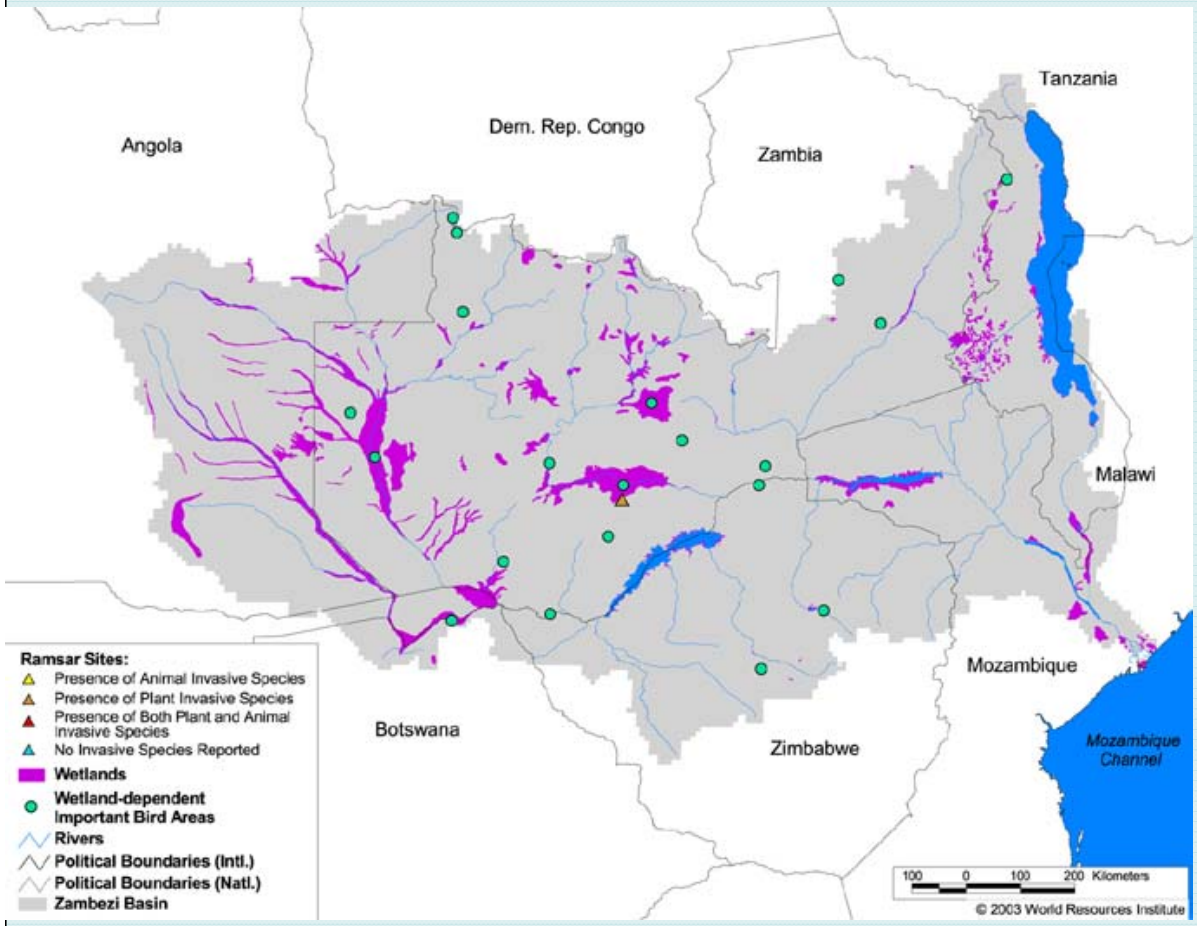
- flooding patterns and their temporal dynamics
- assessment of upstream flow regimes critical to sustain key flooding patterns
- implications of future water development for flooding
- increased awareness of flood benefits
- improved capacity to better manage water resources

“Integrated management of the Sudd Wetland: Improved livelihoods and conserved ecosystem services”

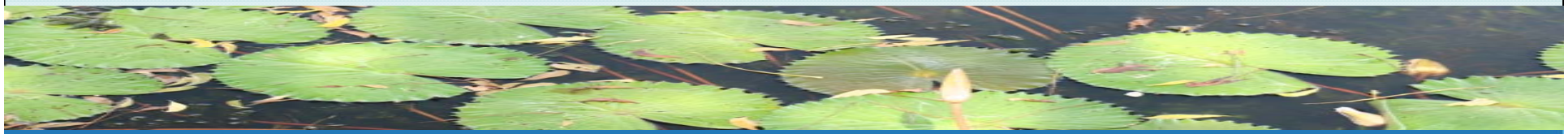
- key habitat and ecological zones and relationship to flooding
- characterisation of the Sudd Wetland
- provision of baseline biophysical information



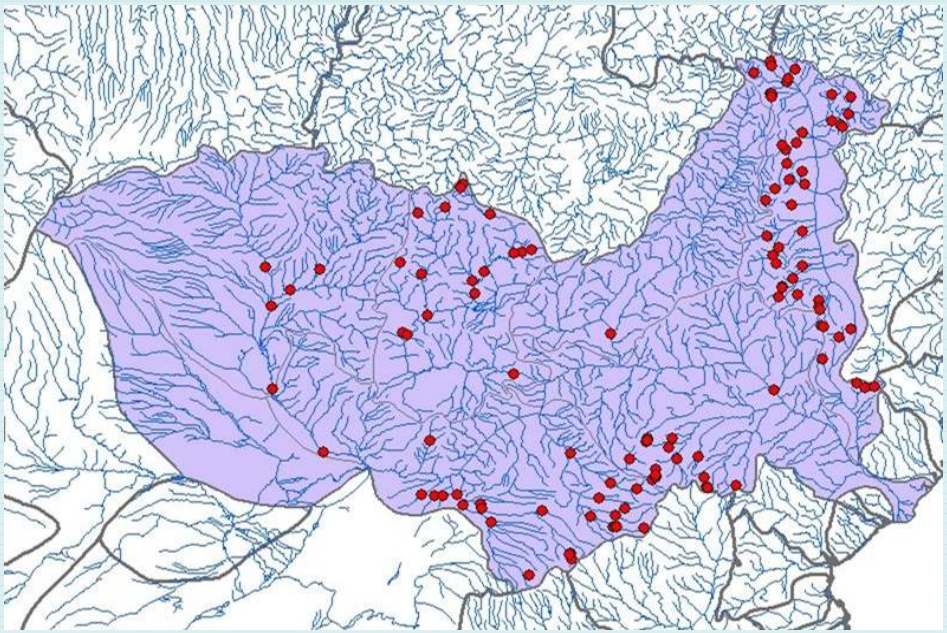
The Zambezi basin:



- **One of the most overused river systems in the world**
- **High degree of river fragmentation**
- **12 dams within the basin**
- **8 Ramsar sites**
- **Floods in March 2000, exacerbated by Zimbabwe opening flood gates to Kariba Dam**
- **Floods in Feb 2007, Jan 2008**



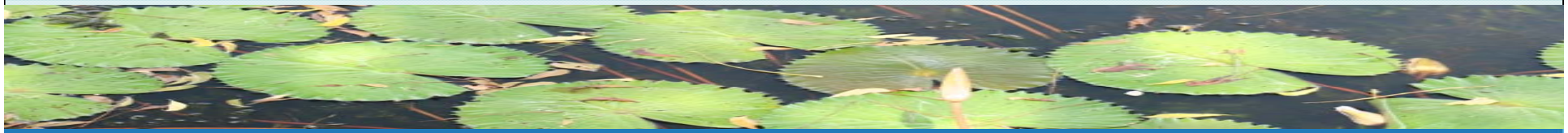
The Zambezi basin:



Zambezi basin
River network
Gauging stations

- little quantitative data exist on seasonal patterns of inundation or wetland extent

- inundation patterns will be useful for
  - baseline information for Ramsar sites
  - dams, current and future scenarios
  - impact of future river regulations
  - Environmental Flow Requirements



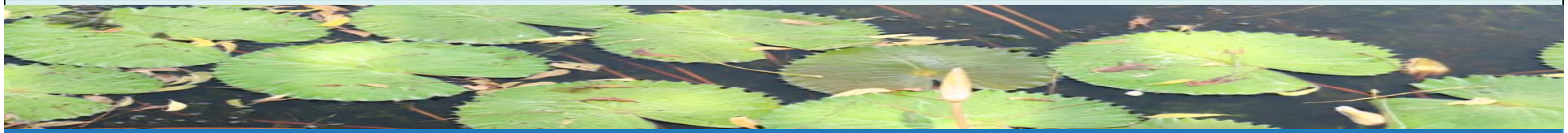
The Zambezi basin: Environmental Flow Requirements

- Under historical conditions annual floods spread floodwaters over vast areas of the delta plain

- In recent years regulated outflows by several large dams have had a profound impact on the system

    - Zambezi flows rarely exceed the minimum threshold for inundating the north bank floodplain
    - The south bank is only flooded during very large flooding events
    - In the delta these changes have led to a fundamental shift in water balance, from a flood-driven system to a rainfall-driven system

- Analysis of spatial patterns of inundation of the floodwaters:
    - WWF EFRs study, Zambezi basin/Delta



Wetlands utilized for agriculture in southern Africa

At a regional scale:

- wetlands used for agriculture in southern Africa
- mapped and assessed through remote sensing
- capacity building and knowledge generation

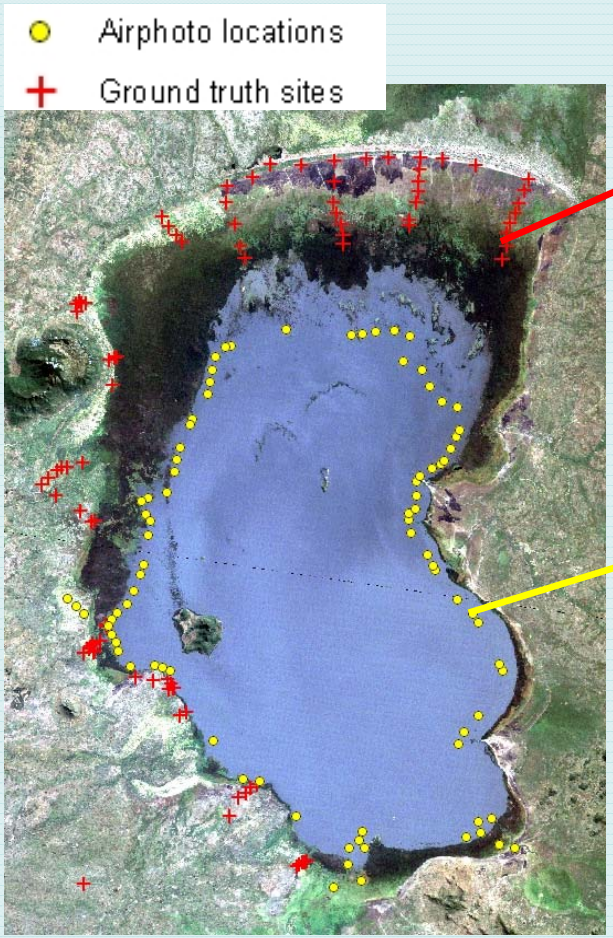
Part of a larger project (Sustainable development and management of wetlands for poverty alleviation):

- assess the manner in which local communities can sustainably use wetlands for multiple purposes
- put in place/enhance mechanisms that minimise the degradation of wetlands
  - optimise the livelihood benefits
- develop generic guidelines, tools and methods
  - sustainable and improved land and water management in wetlands

Priority wetland sites selected in eight countries in southern Africa:

- vulnerable to both climatic variability and agricultural activities
- Population pressure and increased exploitation of resources within the wetlands and catchments
  - leading to serious degradation and loss of biodiversity and ecosystem services

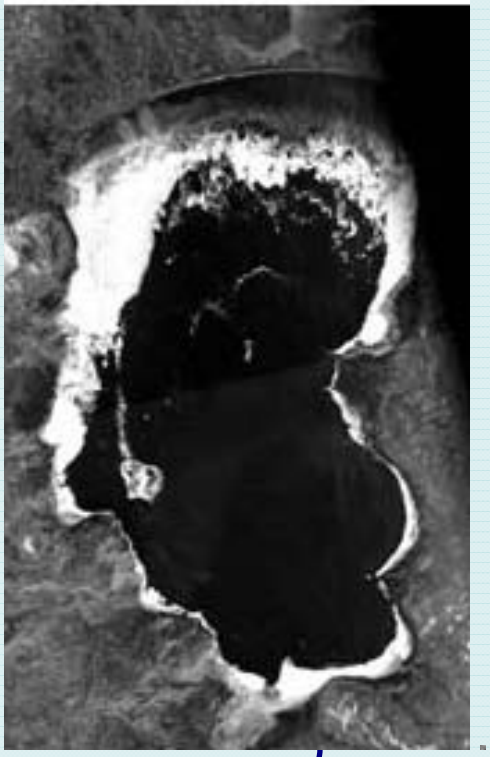
Lake Chilwa wetlands, Malawi



Landsat TM real colour composite (3,2,1) May 2006

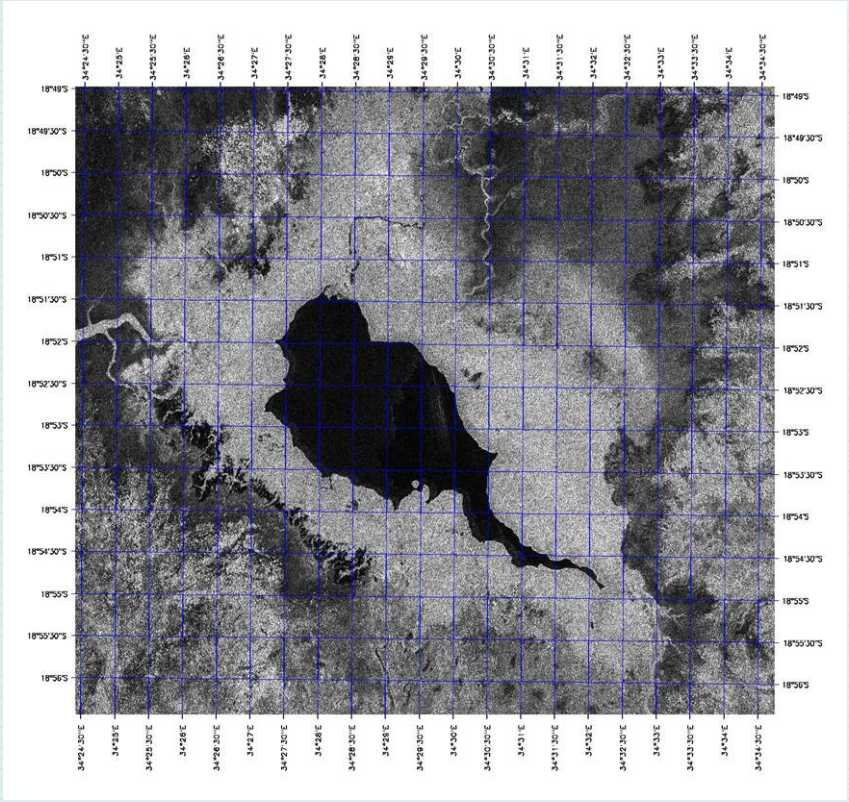
Spatial distribution of wetland communities

PALSAR FBS 20060603



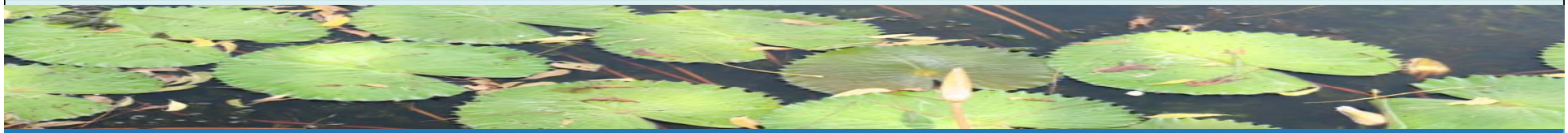
www.iwmi.org

Gorongosa National Park, Mozambique : Lake Urema wetlands



120 Field sites

300 aerial photos



Improving water and land resources management for food, livelihoods and nature

Project status and product generation:

- Spatial inundation mapping, Upper Nile, Zambezi
  - feed into Ramsar and STRP agenda
    - global inventory needs/database
    - basin level inundation and flood mapping
  - report to STRP in Jan 2008
  - EFRs for the Zambezi basin and Delta and the While Nile
- Individual site analysis
  - Lake Chilwa, Malawi,
  - Lake Urema, Mozambique
  - The Sudd Wetland, Sudan