



Geospatial data in the World Network of Biosphere Reserves

Huangshan Dialogue on UNESCO Designated Places and Sustainable Development – Application of space technologies for WH, BRs and Geoparks

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MAN AND BIOSPHERE PROGRAMME

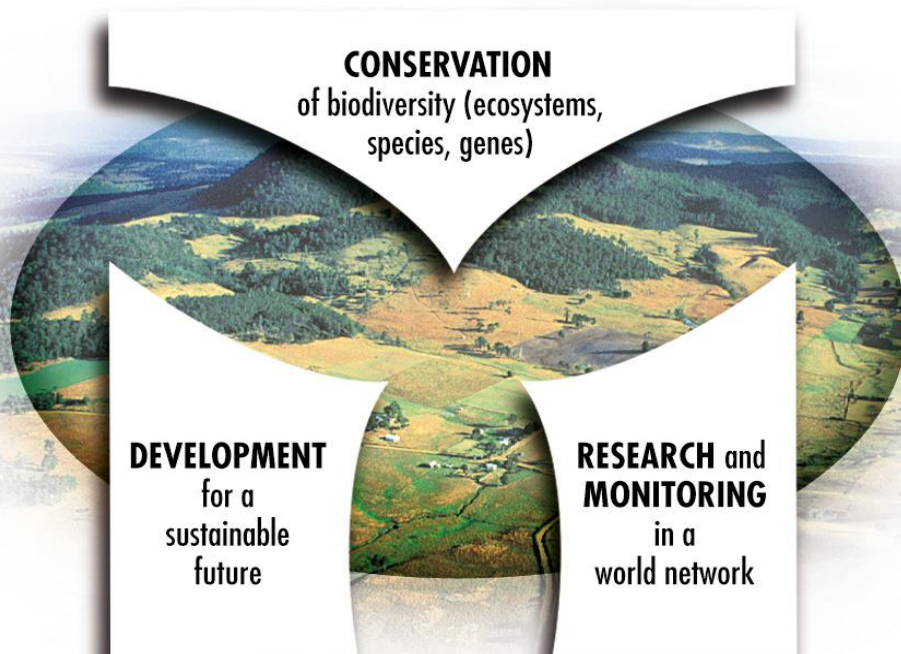


1. Biosphere Reserves – basics



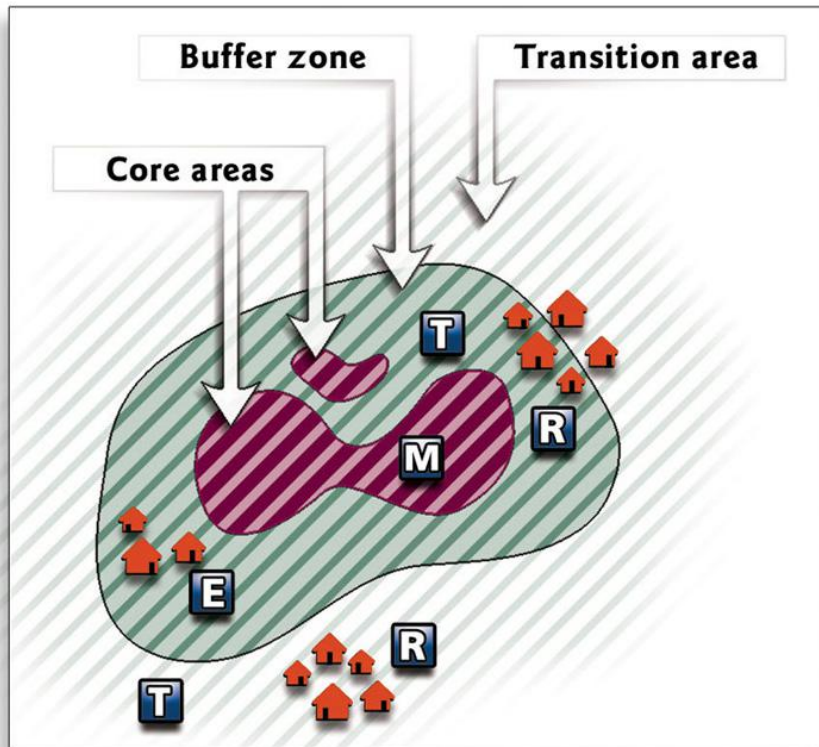
The Biosphere Reserve Concept

A tool for interdisciplinary work with a triple function:



- Conserve biological and cultural diversity
- Propose innovative approaches to sustainable development – working with people
- Promote research, monitoring, education and training

Biosphere Reserves – Key Features



Zoning – means to ensure biodiversity management in multi-use areas with the objective of sustainable development.

Organizational/governance arrangements – enabling involvement of all actors in management-making processes.

New forms of **institutional cooperation** and links between different levels of political, economic and scientific decision making.

Engagement of all the relevant stakeholders

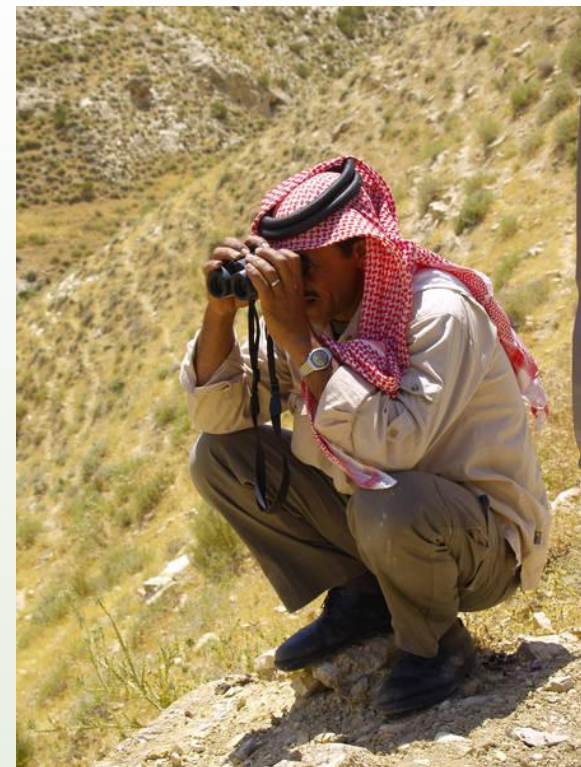
A Biosphere Reserve is:

- 1) Area for the conservation of the environment (to maintain biological and cultural diversity)



Science and research

Studies on antelope population dynamics in Mujib BR (Jordan)



A biosphere reserve is:

- 2) Area to demonstrate sustainable (economic) development



Sustainable development: Organic agriculture in Luberon-Lure BR (France)





A biosphere reserve is:

3. Area of scientific interest to study human-environment interrelations, and sites for education and learning



Aya BR (Japan)

One of the first towns in Japan to develop a recycling policy
– a green city



World Network of Biosphere Reserves 2013-2014
621 UNESCO biosphere reserves in 117 countries

Réseau mondial des réserves de biosphère 2013-2014
621 réserves de biosphère de l'UNESCO dans 117 pays

Red Mundial de Reservas de Biosfera 2013-2014
621 reservas de biosfera de UNESCO en 117 países

Weltnetz der Biosphärenreservate 2013-2014
621 UNESCO-Biosphärenreservate in 117 Staaten

U.S. HOUSE OF REPRESENTATIVES

U.S. HOUSE OF REPRESENTATIVES

A photograph showing two farmers in a lush green rice field. Both are wearing blue long-sleeved shirts and wide-brimmed straw hats. The farmer on the left is bent over, carefully planting rice seedlings into the water. The farmer on the right is standing upright, holding a large bundle of rice seedlings. The background is a vast, green rice paddy under a bright sky.



621 Biosphere Reserves in 117 countries
12 transboundary Sites

[illegible]



2. Geospatial data needs





Geospatial data: essential for BR identification, functions & management

- Location, topography, land use, land cover...
- Madrid Action Plan (MAP) on zonation/site management
- MAP Target 2: ISPs cooperation
- MAP Target 3 (3.1,3.2,3.3): Integrated information and communication
- MAP Target 24.1, 24.2, 24.4: Learning sites for research, adaptation, mitigation in relation to climate change
- MAP Target on monitoring and TBR



A Classification of the Biogeographical Provinces of the World

By

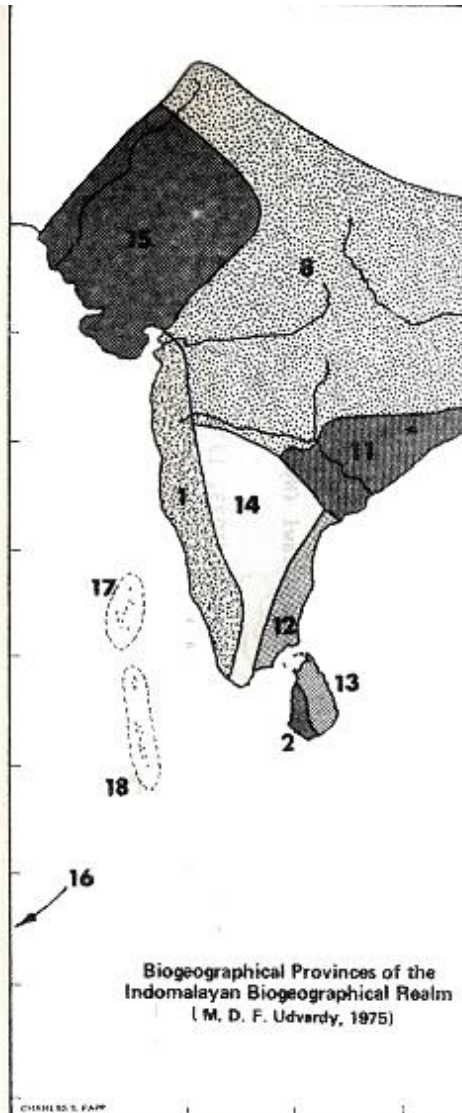
Miklos D. F. Udvardy

Prepared as a Contribution to UNESCO's
Man and the Biosphere Programme
Project No. 8



IUCN OCCASIONAL PAPER NO. 18

INTERNATIONAL UNION FOR CONSERVATION OF NATURE AND NATURAL RESOURCES
MORGES, SWITZERLAND, 1975



Biogeographic
Province:

1: Malabar Rainforest

2: Ceylonese Rainforest

:

4: Burma Rainforest

5: Indochinese Rainforest

6: South Chinese

Rainforest

7: Malayan Rainforest

:

9: Burma Monson Forest

10: Thailandian Monson
Forest

:

:

20: Anaman and Nicobar
Island

22: Java

23: Lesser Sunda Islands

24: Celebes

25: Borneo

26: Philippines

:

ACCESS

A Directory of Contacts,
Environmental Data Bases,
and Scientific Infrastructure
on 175 Biosphere Reserves
in 32 Countries

Austria
Belarus
Bulgaria
Canada
Croatia
Czech Republic
Denmark
Estonia
Finland
France
Germany
Greece
Hungary
Italy
Kyrgyzstan
Malta
Netherlands
Norway
Poland
Portugal
Romania
Russia
Slovakia
Spain
Sweden
Switzerland
Tajikistan
Ukraine
United Kingdom
United States
Uzbekistan
"Yugoslavia"

EuroMAB BRIM: Meta data on 72 Most Common Databases

BASIC RESOURCE INFORMATION

X - EXISTING PROGRAM # - NUMBER OF YEARS OF RECORDS * - PRIORITY AREA

BIOLOGICAL INVENTORY							ECOLOGICAL MONITORING							RESOURCE MAPS								
INVERTEBRATES	MAMMALS	BIRDS	NONVASCULAR PLANTS	VASCULAR PLANTS	VERTEBRATES OTHER THAN MAMMALS	BIOLOGICAL SURVEY AND COLLECTIONS	AIR QUALITY	CLIMATE	FRESHWATER ECOSYSTEMS	GROUNDWATER HYDROLOGY	MARINE ECOSYSTEMS	PALEOECOLOGY	PRECIPITATION CHEMISTRY	SURFACE HYDROLOGY	VEGETATION DATA	WATER QUALITY	GEOLOGICAL	LAND USE	REGIONAL LAND TENURE	SOILS	TOPOGRAPHIC	VEGETATION

RUSSIAN FEDERATION

ASTRAKHANSKIY	65	65		65	65	65	X	4	47	41	12				41	65		X			X	X	X
KAVKAZSKIY	62	62		62	62	62	X	5	60	10	60			5	60	62	15	X	X		X	X	X
KRONOTSKIY	7	10		7	10	10	X		18						X	20		X			X	X	X
LAKE BAIKAL: BAIKALSKIY	7	10		7	10	10	X		18						X	20		X			X	X	X
LAKE BAIKAL: BARGUZINSKIY		13		3	8	13	X	2	14						X						X		
LAPLANDSKIY		50			30	50	X	10															
OKA RIVER VALLEY	15	40		X	40	40	X			50	X				53	50	30						X
PECHORO-ILYCHSKIY	X	20		X	20	20	X		X	X					X	X	X		X				X
SAYANO-SHUSHENSKIY	10	10		7	10	10	X		10	10					10			X			X	X	X
SIKHOTE-ALINSKIY	50	50		50	50	50	X	3	40	15					10	50		X			X	X	X
SOKHONDINSKIY		X			X	X	X		X		X				X	X	X					X	X
TSENTRAL'NO-CHERNOZEMNY	40	50		20	50	50	X		40						30	35			X		X	X	X
TSENTRAL'NO-LESNOY	50	50		50	50	50	X	2	18		50				50	50	4	X	X		X	X	X
TSENTRAL'NOSIBIRSKIY		2			2	2	X								2								X
VORONEZHSKIY	10	40		5	50	40			54														

SLOVAKIA

EAST CARPATHIANS	X	X		X	X	X	X		X	X					X		X	X	X		X	X	X
POLANA	X	X		X	X	X	X	X	X				X				X	X			X	X	X
SLOVENSKY KRAS	10	35	X	35	55	35	X		50	X	20		X	30	18	28	X	X			X	X	X
TATRY	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X		X	X	X

La Selle Biosphere Reserve, Haiti

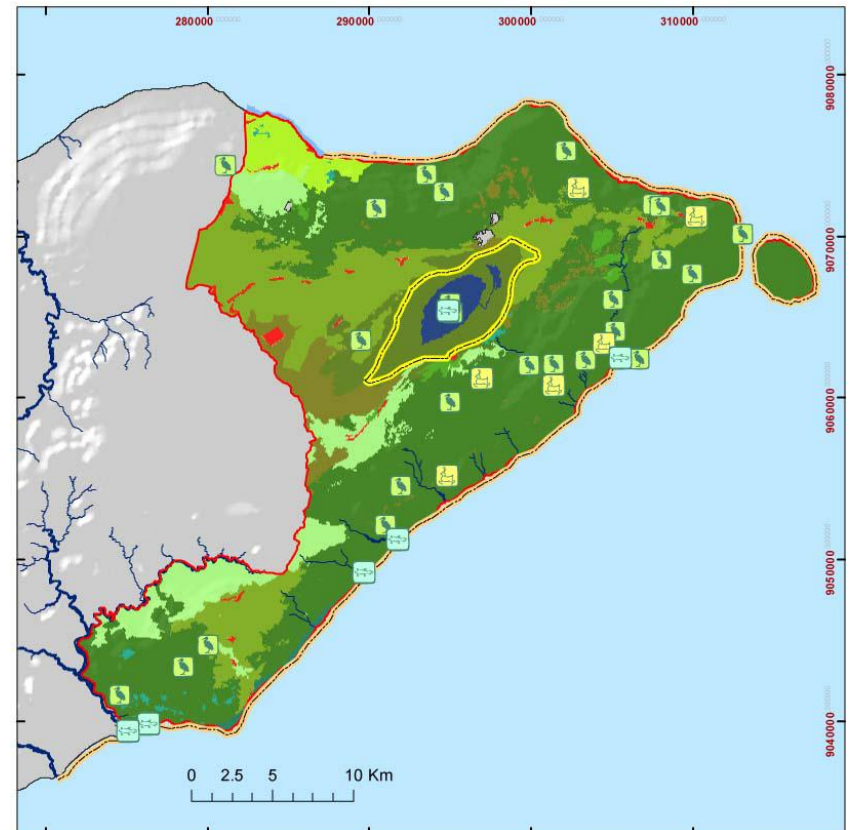
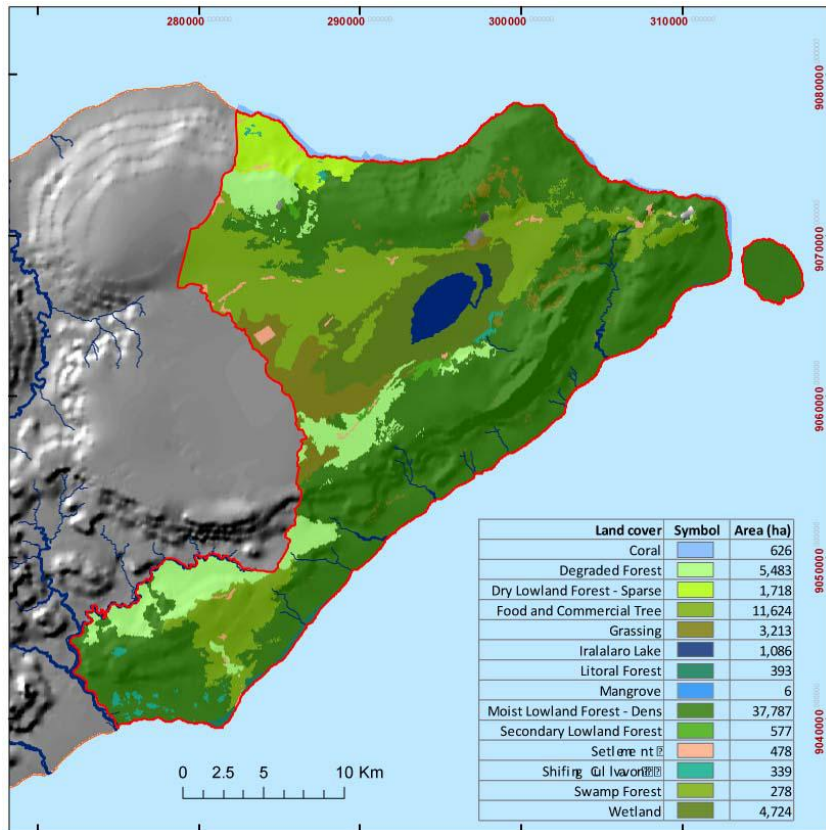


BR nomination of Nino Konis Santana NP - Timor Leste

- Conducting mapping of vegetation cover using high resolution imagery
- Data collection:
 - Initiate ecosystem and species mapping
 - Data collection - biophysical, socio-economic, cultural
 - Preparation of BR nomination dossier



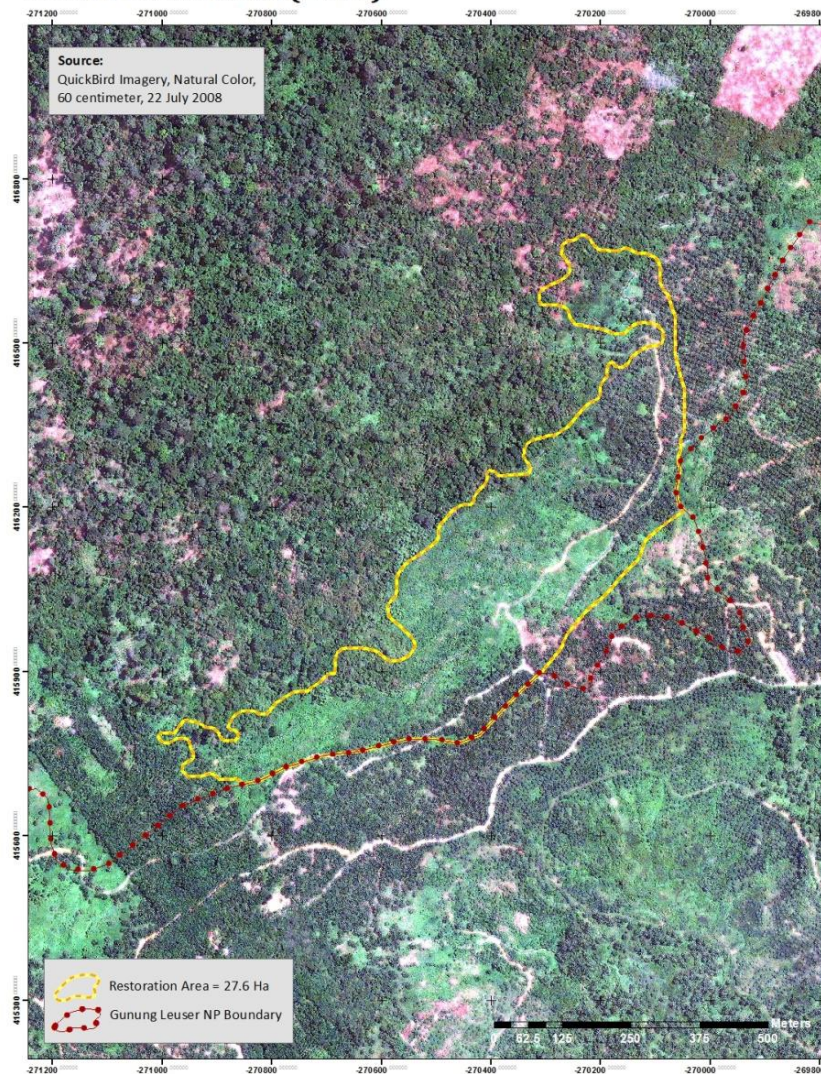
Mapping of the existing conditions in Nino Konis Santana NP, Timor-Leste



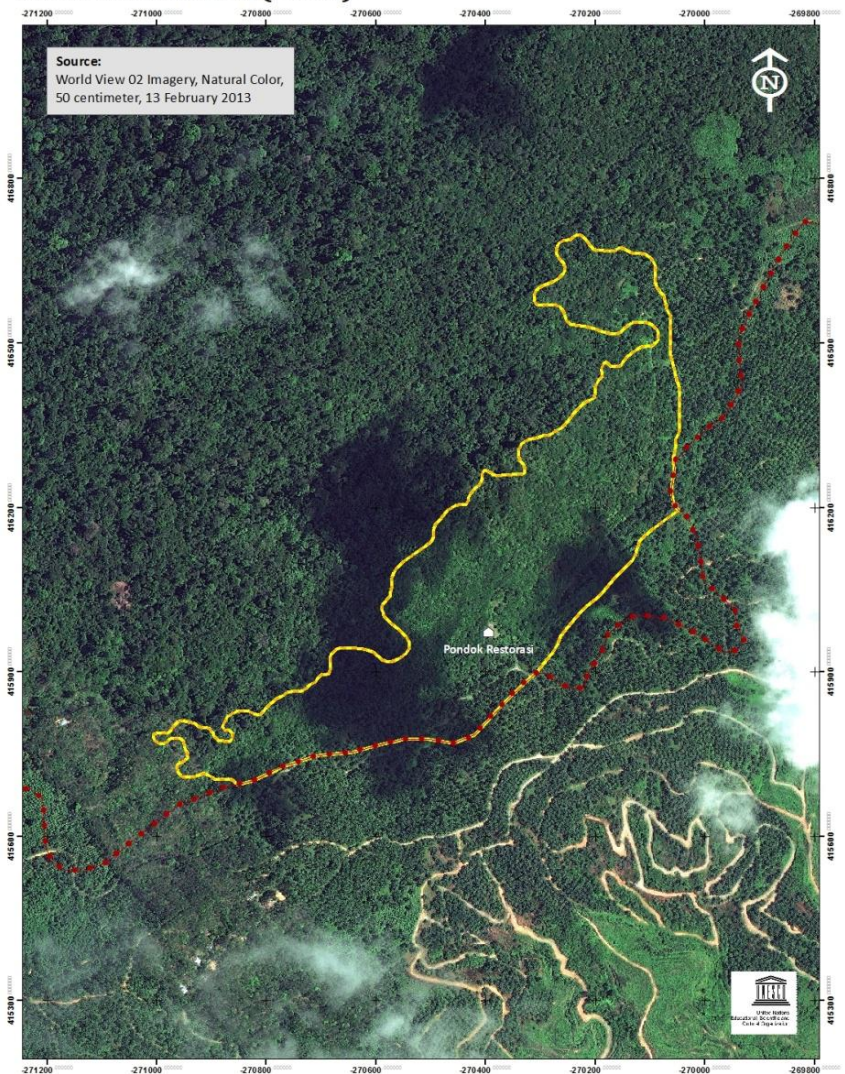
Examples of analysis carried out by UNESCO Jakarta

Remote Sensing Analysis of Ecological Restoration Area in Gunung Leuser National Park

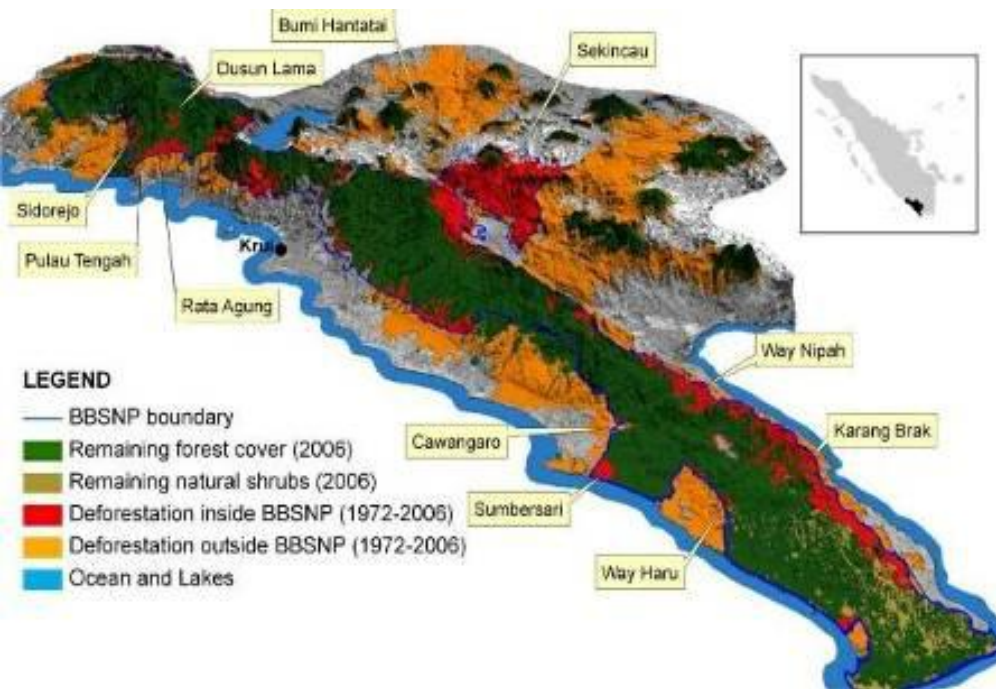
Vegetation Cover Changes Restoration Area, Sei Serdang GLNP Before Restoration (2008)



After Restoration (2013)



Tropical Rainforest Heritage of Sumatra

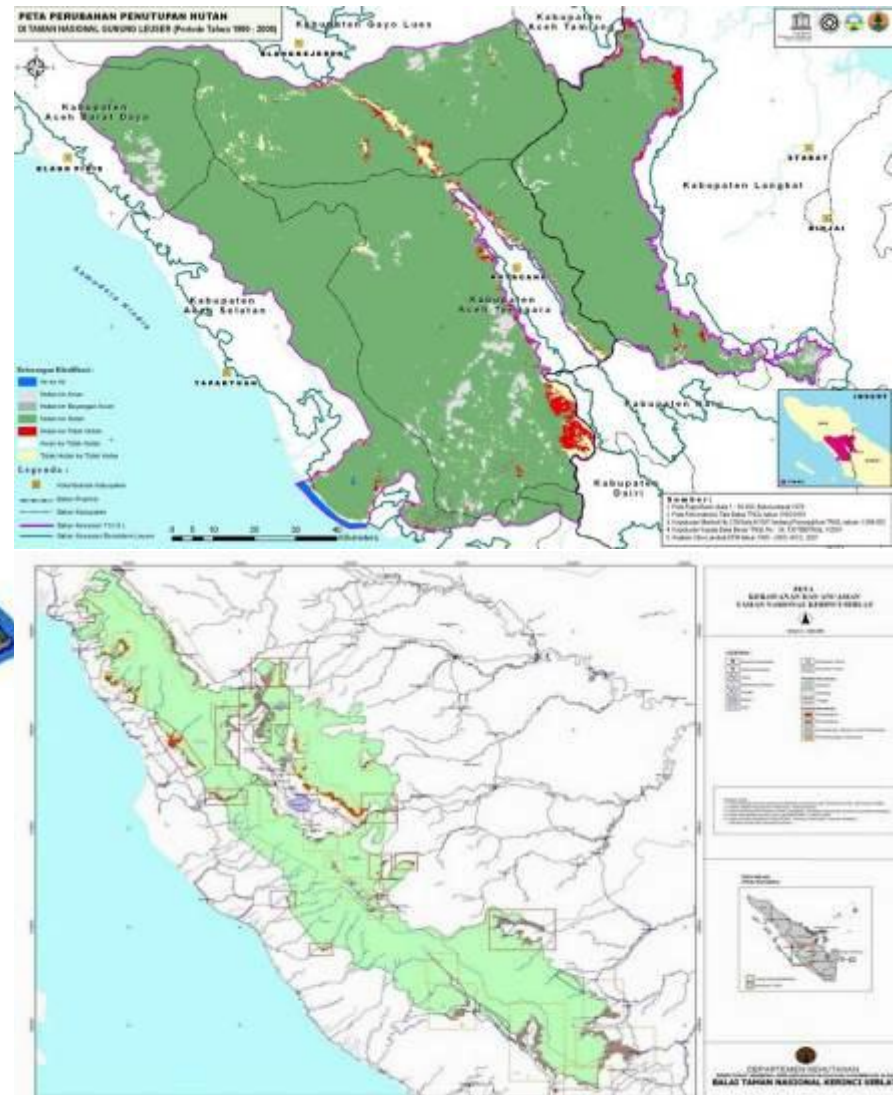


Encroachment: current situation

Draft Decision: 33 COM 7B.15

Page number: 7B.Add 29-30

WHC-09/33.COM/7B SOC - Properties inscribed on the World Heritage List





Industrial accidents may cause huge damage to conservation





MR/UNESCO INTERNATIONAL WORKSHOP
GLOBAL CHANGE RESEARCH

in Mountain
**Biosphere
Reserves**

BIODIVERSITY

CONSERVATION

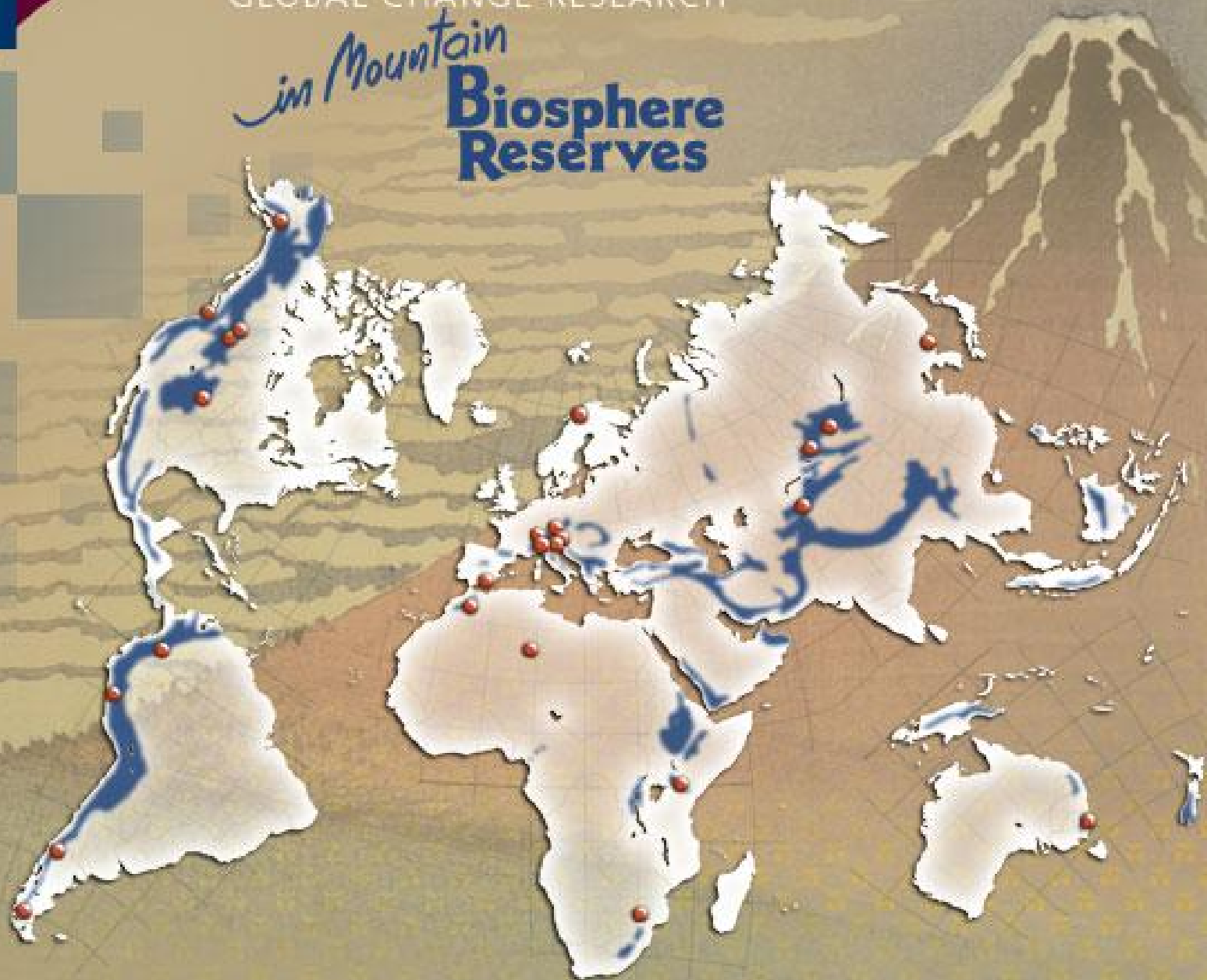
RESEARCH

MONITORING

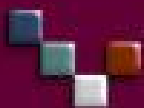
EDUCATION

TRAINING

SUSTAINABLE
DEVELOPMENT



Mountain Biosphere Reserves for global change study





GLOCHAMOST Project (Global Change in Mountain Sites – Elaboration of Adaption Strategies for Mountain Biosphere Reserves; since 2009)

→ implements GLOCHAMORE Research Strategy, in:

- Mount Arrowsmith BR (Canada)**
- Changbaishan BR (China)**
- Berchtesgaden BR (Germany)**
- Nanda Devi BR (India)**
- Huascarán BR (Peru)**
- Katunskiy BR & Teberdinskiy BR (Russian Fed.)**
- Sierra Nevada BR (Spain)**
- Swiss National Park BR (Switzerland)**





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International
Hydrological
Programme



Man and
the Biosphere
Programme

With the support of the
Government of Flanders



Exhibition and High Level Panel session during the 37th General Conference of UNESCO

Climate change impacts
on mountain regions of the world

*Impacts du changement climatique
sur les régions montagneuses à travers le monde*





Natural Resource Database Management Systems (NRDMS)

- Department of Science & Technology (DST), Government of India under its Natural Resource Database Management Systems (NRDMS) programme, Bio Geo database, has taken up the spatial quantification of ecosystem dynamics in select biosphere reserves
- UNESCO New Delhi has partnered with the Indian Institute of Information Technology (IIIT) Trivandrum to set up an eco-informatics programme with focus on Western Ghats and Nilgiri Biosphere Reserve.





INVENTORISATION AND MONITORING OF BIOSPHERE RESERVES IN INDIA USING REMOTE SENSING & GIS TECHNOLOGY

THE PROJECT

Biosphere Reserve programme in the country emphasizes India's commitment for the implementation of Man and Biosphere (MAB) programme towards achieving the long term conservation and sustainable development goals enshrined within the concept of Biosphere Reserves (BRs). An urgent need has been felt to develop a coordinated programme to strengthen research on critical issues and to formulate a 'Perspective Plan' for intensive management of BRs in the country. In this context, with the funding support of National Natural Resource Management System (NNRMS) programme of the Ministry of Environment & Forests, Govt of India, the G.B. Pant Institute of Himalayan Environment & Development, along with partner institutions, has supported a country wide project to:

1. Create Natural Resources and social database using latest Remote Sensing (RS) images of existing BRs in India with a focus on Landuse Land Cover maps.
2. Study temporal changes in the land use dynamics (at 5 year interval starting from 1990 or from the date of notification) as result of BR management.
3. Make recommendations for effective management of BRs for redefining the zones/boundaries.
4. Develop and test RS/GIS based approaches for assessment and valuation of ecosystem services in a selected BR of the Himalayan region.

The National Natural Resources Management System (NNRMS) programme of the Ministry of Environment & Forests, Govt. of India, supports the national requirements of natural resource management and developmental needs by generating a proper and systematic inventory of natural resources. Over the past twenty years the NNRMS programme has steered generation of spatial information using remote sensing data from various IRS missions.



Focal Area:
Natural Resource Management

Funding Agency:
Ministry of Environment & Forests
(Government of India), New Delhi

Lead Organization:
G.B. Pant Institute of Himalayan
Environment & Development, Kosi-
Katarmal, Almora

Partner Organizations:
National Remote Sensing Center,
Hyderabad

Forest Survey of India, Dehradun
M.S. Swaminathan Research
Foundation, Chennai

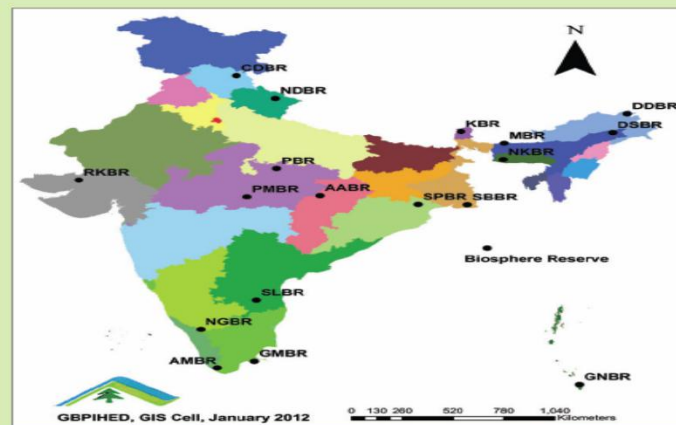
FACT FILE

EXPECTED PROJECT OUTCOMES

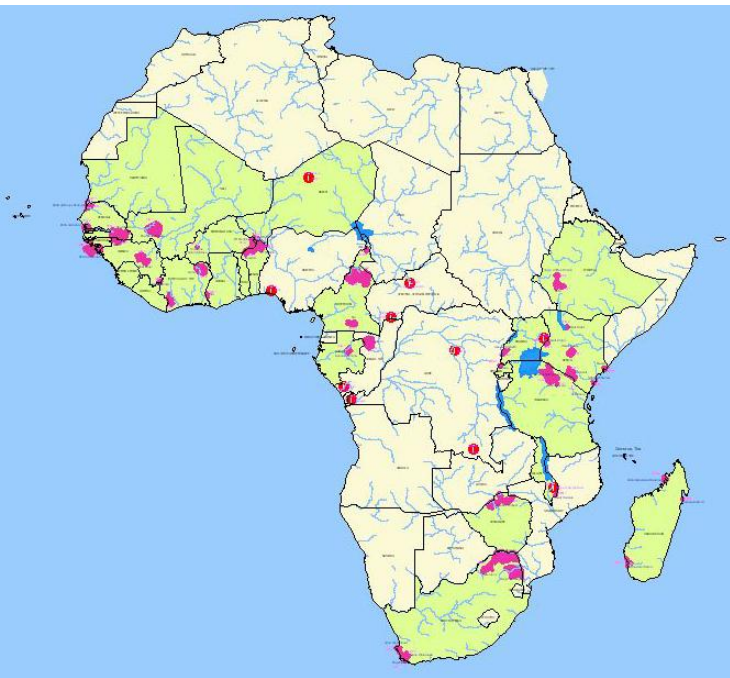
1. Formulation of comprehensive Management Plan w.r.t. each BR
2. Decision support system through GIS based Resource Mapping
3. Ecological simulation of natural resources for prediction and scenario development
4. Monitoring indicators for effectiveness /impacts of various Schemes/Programmes

Following the UNESCO's guidelines and criteria, the Indian National Man and Biosphere (MAB) Committee identifies and recommends potential sites for designation as Biosphere Reserves.

As on January 2012, eighteen Biosphere reserves have been designated in the country.



Effort in Africa



- An interactive web-based map of 30 out of 58 BRs - including 2 transboundary BRs - in 27 countries in Sub-Saharan Africa: unique learning sites and global network for sustainable development
- Designed and developed through collaboration between the Regional Center for Mapping of Resources for Development (RCMRD), Nairobi, and biosphere reserve managers with support from UNESCO



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Man and
the Biosphere
Programme

BRs involved

Biosphere reserves by country

Sub Saharan Africa

Biosphere reserves by country	Total
Benin	1
Burkina Faso	1
Cameroon	3
Central African Republic	2
Congo	2
Ivory Coast	2
Democratic Republic of Congo	3
Ethiopia	2
Gabon	1
Ghana	2
Guinea	4
Guinee Bissau	1
Kenya	6

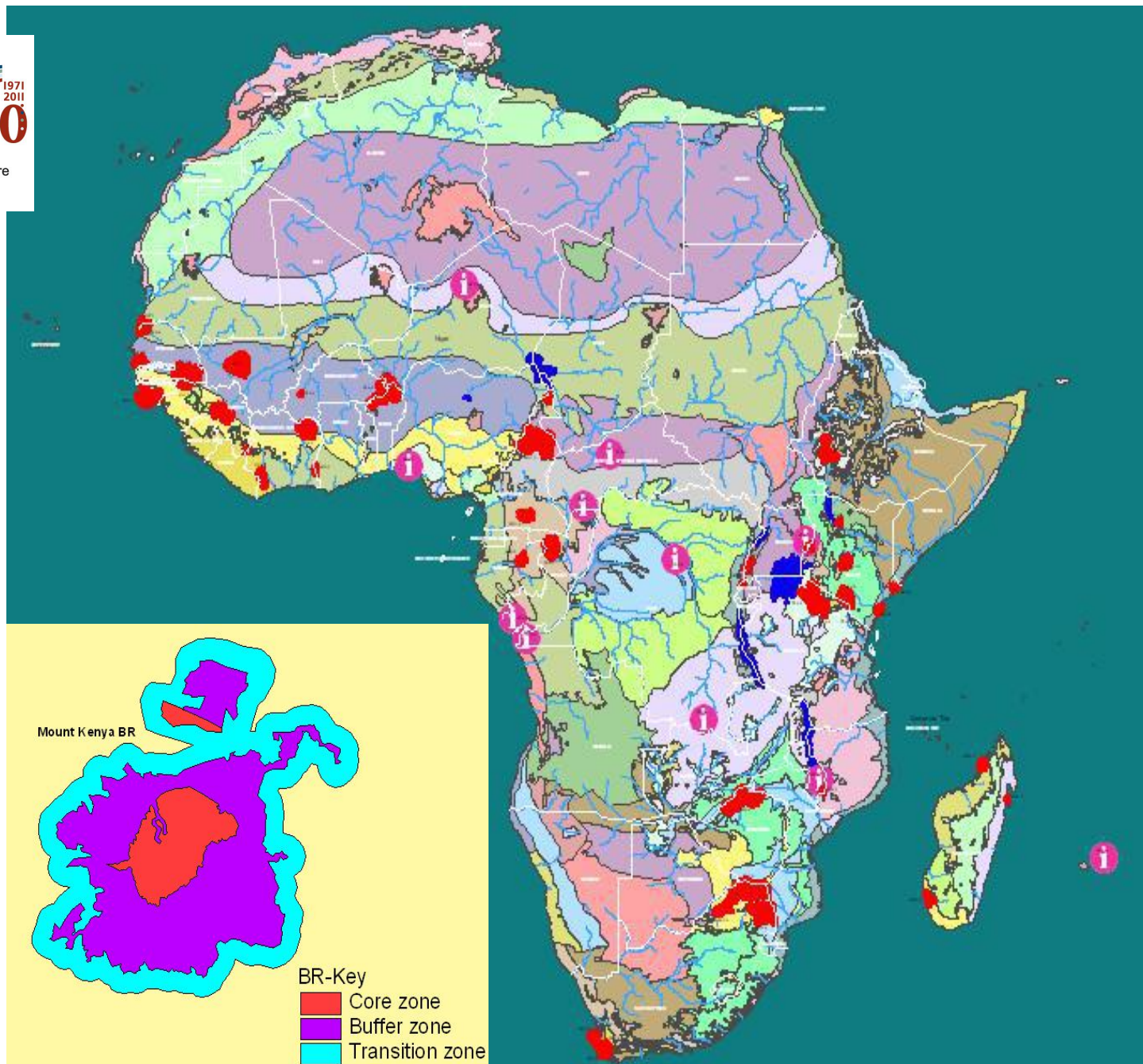
Madagascar	3
Malawi	2
Mali	1
Mauritius	1
Niger	1
Nigeria	1
Rwanda	1
Senegal	3
South Africa	6
Togo	1
Uganda	2
United Republic of Tanzania	3
Zimbabwe	1
Transboundary Benin/Burkina/Niger	
Transboundary Mauritania /Senegal	
Total	56 + 2



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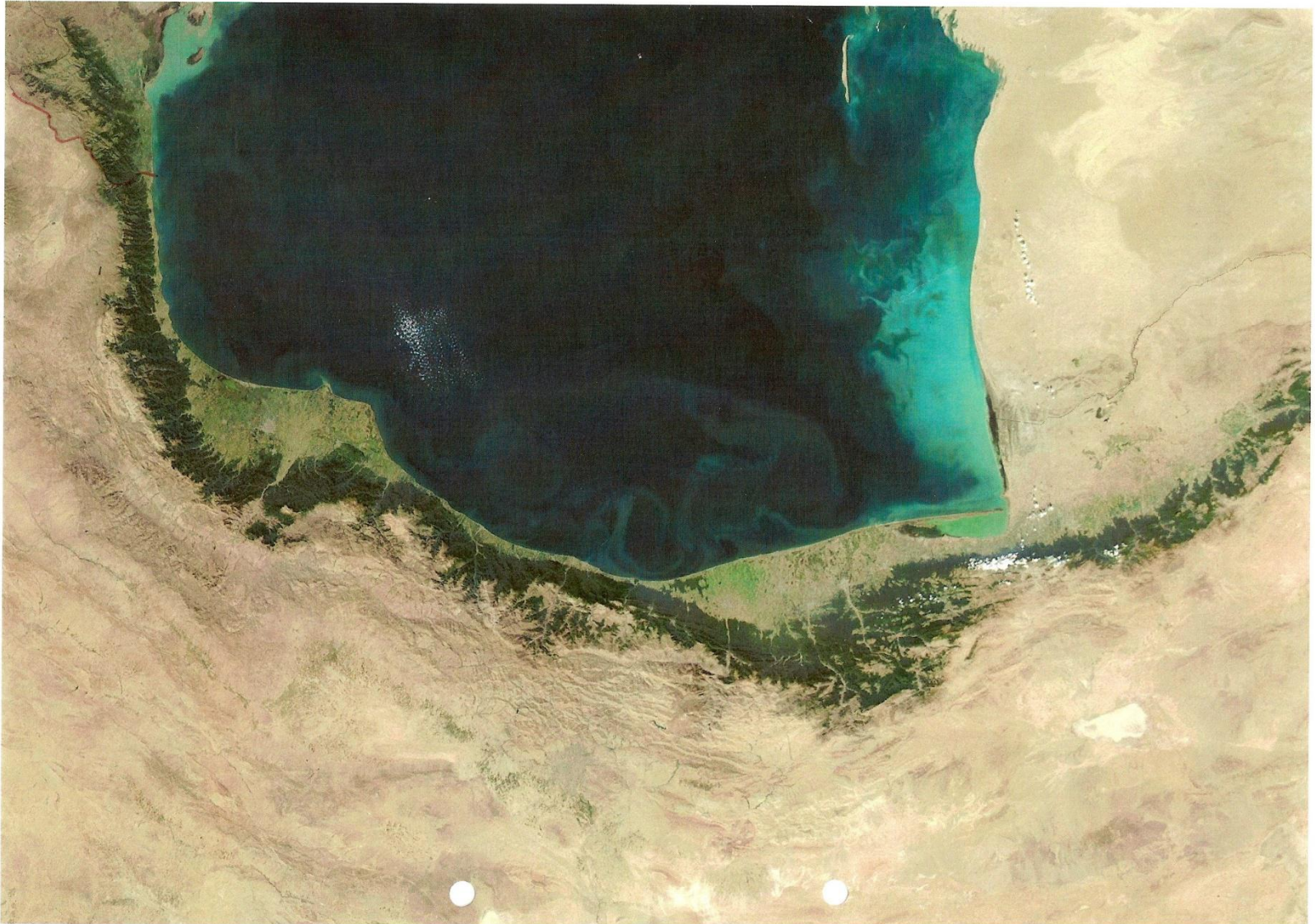


For ecological integrity: Giant Panda cluster WH/BRs, linked by corridors – a process over 20 years: now 14 sites of apprx. 950,000ha

Protected Areas of Northern Iran



Caspian Forests





A sustainable development field observatory of UNESCO designated Biosphere Reserves

The Biosphere Smart Initiative promotes the transition to green societies and sustainable futures by facilitating networking and information sharing of smart knowledge gained in UNESCO Biosphere Reserves through the use of new information and communication technologies.

The Biosphere Smart Initiative includes a global observatory and information facility, the *Biosphere Smart Information Platform* created to facilitate sharing of ideas, best practices, and experiences among UNESCO designated Biosphere Reserves on challenges and smart solutions related to climate change, green economies, and sustainable development at large.

World RB Zonations

- Core area
- Buffer area
- Transition area
- Marine Core area
- Marine Buffer area
- Marine Transition area
- Surface area
- Marine area



Shennongjia

1992

China (People's Republic)

70,467 ha.

Temperate and subpolar broadleaf forests or woodlands; mixed mountain and highland systems

Population 8,370.

[Visit BR](#) [Map](#) [Zonation](#) [MaB](#)



My Biosphere Reserve

becomes smarter



BiosphereSmart
initiative

In partnership with:



BRs as tools of learning



GLOBAL

World Network
of Biosphere Reserves

Biosphere Smart
Information Platform



LOCAL

Smart Biosphere Reserves
BR Digital

www.biospheresmart.org



4. Moving forward: challenges and opportunities

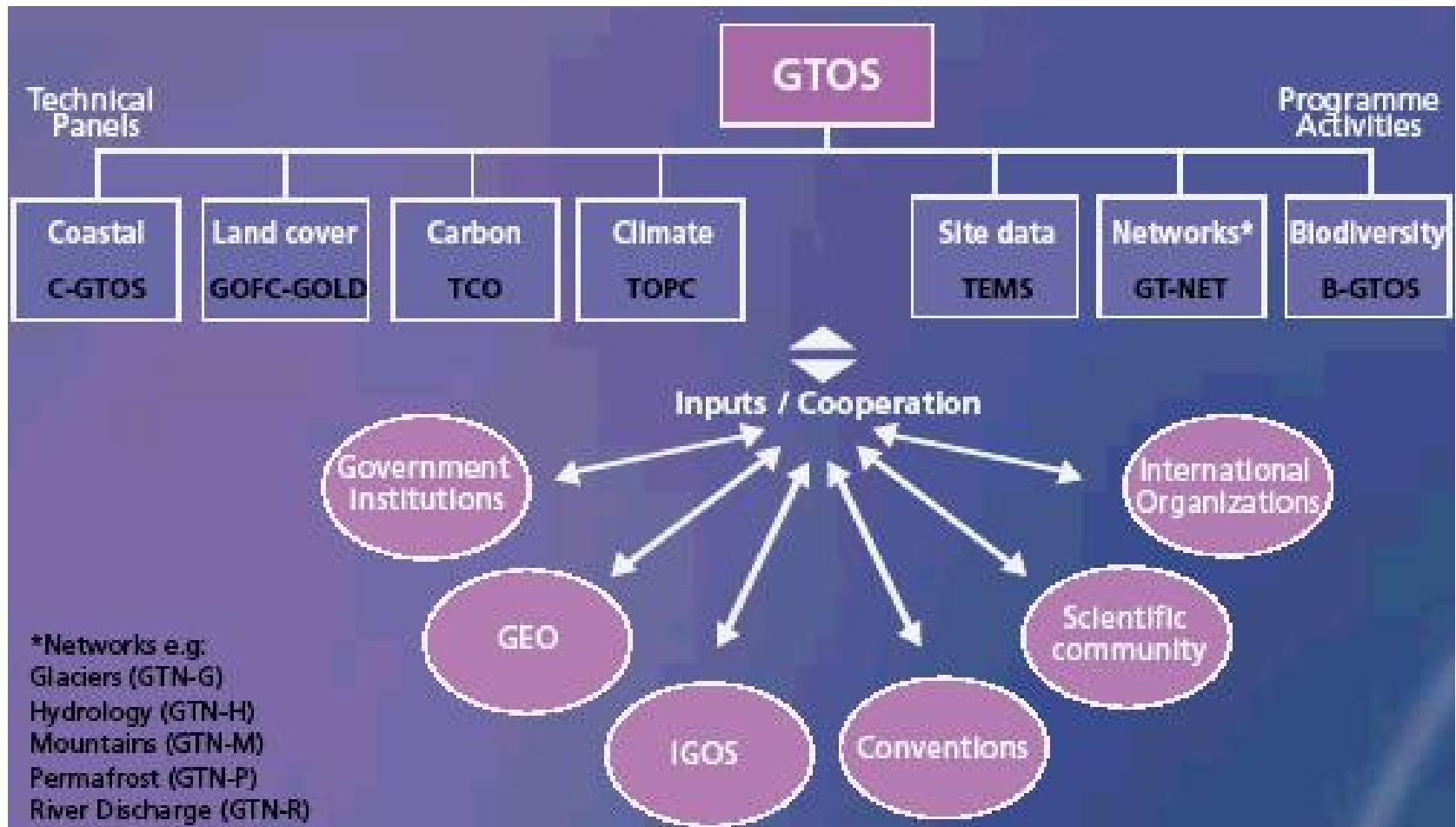
- Very limited technical capacity at site level for most developing countries
- Very limited technical expertise and human resources at the Secretariat
- Initiatives are many, but are project specific and lack technical coherence
- Lack of access to available work and results
- Organizational issues



New form of partnership required

- For Africa, the interactive web-based map was developed with the Regional Center for Mapping of Resources for Development (RCMRD) – a high-performance regional partnership, funded by UNESCO.
- To ensure sustainability, a win-win partnership has to be set up.
- This is also the case for the Secretariat – must rely on partnerships

GLOBAL TERRESTRIAL OBSERVING SYSTEM (GTOS)



Indicators – lessons learnt (cont)



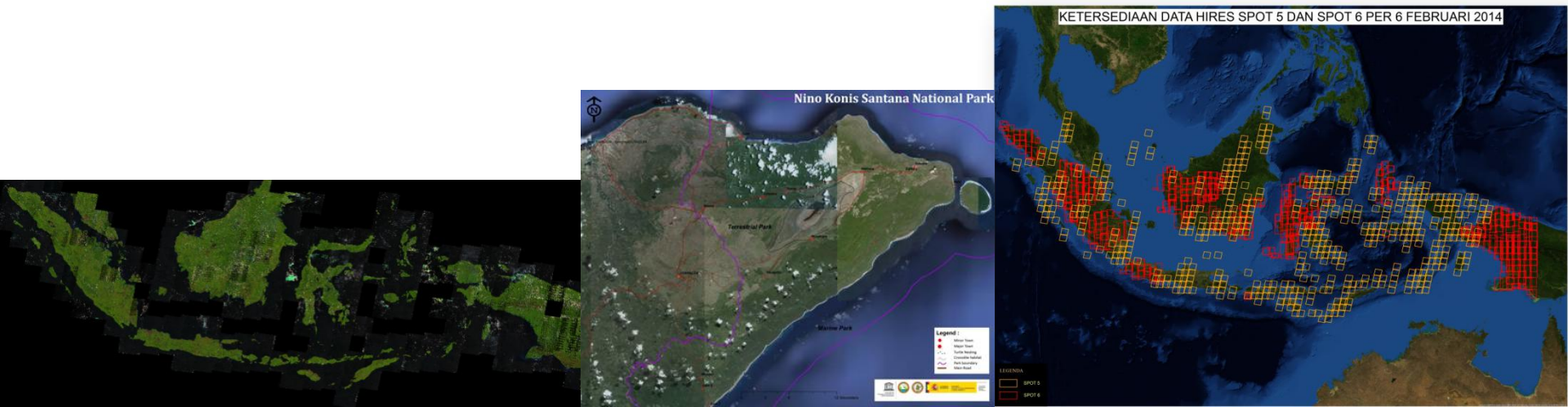
Australian Government

Great Barrier Reef
Marine Park Authority

- Indicators must reflect changes at spatial and temporal scales of relevance to management and what needs to be measured
- Need differing indicators for site level and system level
- Think of your audience when developing indicator
 - *'Traffic light'* approach for simple depiction
- Ecological goals, socio-economic and governance goals are not mutually exclusive; but they do need different evaluation criteria/indicators.

Opportunities

- Growth of UNESCO category II institutes
- Existing agreement for support from leading space agencies
- UNESCO's Open Access Policy
- Strong interest from many research institutions and some private sector companies
- Rapid development of ICTs and internet-based services
- Possible use of common platforms such as Google Maps



Conclusion

- An ***geospatial data and service consortium*** is needed for the WNBR and for WH and Geoparks – MAB would like to bring this forward
- HIST and other committed technical institutions can be very instrumental in developing this new mechanism
- A partnership will be needed with UNEP-WCMC, GBIF – and others