

# **Development of a Functional National-level Environmental Information Systems (EIS) in Malawi: Evaluating and Guiding the Development of a National EIS in Malawi**

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## **Development of a Functional National-level Environmental Information Systems (EIS) in Malawi: Evaluating and Guiding the Development of a National EIS in Malawi**

### **I. History on the development of the Malawi EIS**

The Malawi NEAP made first reference for the need of a national-level Environmental Information System (EIS) in Malawi. The NEAP assumed that the Malawi Environmental Monitoring Programme (MEMP) - in which the University of Arizona and Clark University have since 1994 provided assistance - would take an active role in its development (NEAP, 1995). While the development of an EIS was not officially recognized by the Government of Malawi until 1997 (EIS Design Team, 1997), various EIS-related activities have been conducted in Malawi including: decentralized capacity building in institutions mandated to produce and use environmental information; developing a university level curriculum in the environmental sciences; exploring the use of inexpensive Advanced Very High Resolution Radiometer (AVHRR) for routine environmental monitoring; developing spatial data standards; building capacity in biophysical and social environmental analysis through prototype environmental inquiries such as the Shire investigation and the Public Land Utilization Study; and the developing national environmental legislation (MoREA, 1997, EIS Design Team, 1997; and Snel, Haan, and Eastman, 1997, PLUS.....; ref from TONY.....).

### **II. Conceptual framework of a functional national-level EIS**

The purpose of this paper is twofold: 1) to propose a conceptual framework of a Sustainable EIS (SEIS) which may be used as a basis for evaluating the development of the Malawi EIS and 2) to make recommendations for the continued development of a functional and sustainable national-level EIS in Malawi. An EIS may be defined as a coordinated set of procedures and institutional structures that *routinely* and systematically collects, analyzes, and utilizes environmental information to improve natural resources management. As indicated in Figure 1, an EIS consists of four components: an environmental data infrastructure, environmental information analysis, decision support, and EIS oversight component. The *environmental data infrastructure* component supports such activities as the development of environmental data standards, environmental data acquisition, and environmental data archiving. The *environmental information analysis* component supports such activities as gathering existing environmental data, conducting routine environmental analyses with respect to end user needs (e.g. spanning biophysical and social explanations of environmental change), and recommending mitigation strategies to ameliorate environmental conditions. The *decision support* component specifically focuses on linking environmental information users and producers and specifically deals with such activities as: coordinating and conducting routine environmental information needs assessments; prioritizing local to national

environmental information needs; disseminating environmental information needs to information producers; proposing and supporting final environmental mitigation strategies (both short and long term to ultimately improve natural resource management); disseminating mitigation strategies to end users; and supporting end user environmental information usage (e.g. through extension or environmental support funds/trusts). Last the *EIS oversight* component oversees EIS-related activities and its resource development needs such as in developing an environmental data infrastructure, environmental information analysis capacity, and decision support.

As indicated in Figure 1, adequate attention must be focused on appropriately developing human, technical, institutional, and financial resources to ensure the continuation and maintenance of EIS-related activities. With regard to developing an environmental data infrastructure, for example, it is critical that adequate attention is focused on developing in-country human resources (e.g. in-country knowledge in acquiring and archiving land cover, contour, and soils), technical resources (e.g. in-country hardware and software to acquire and archive environmental data), institutional resources (e.g. in-country institutional mandates, job descriptions, and senior-level support to acquire and archive environmental data), and financial resources (e.g. money to acquire and archive environmental data).

The subsequent section will outline present activities and efforts in Malawi to develop each of the above mentioned EIS components - development of an in-country environmental data infrastructure, environmental information analysis, decision support, and EIS oversight. Furthermore, a list of recommendations to support the development of each of these EIS components will be proposed in support of the continued development of the Malawi EIS. As noted below, EIS related efforts in Malawi have to date focused particularly on developing an environmental data infrastructure and environmental information analysis. More adequate attention will need to be focused on developing decision support and EIS oversight-related activities as Malawi continues developing its EIS.

## II.A. Developing an environmental data infrastructure in Malawi

### II.A.i. Description of environmental data infrastructure activities

As indicated in Figure 2, developing an environmental data infrastructure entails:

1. acquiring environmental data according to standard;
2. archiving environmental data according to standard;
3. developing environmental data standards;
4. developing an environmental data catalogue; and
5. coordinating trainings in environmental data acquisition and archiving.

The acquisition and archiving of *spatial environmental data* is particularly critical in developing an EIS since environmental analyses are typically spatial. Furthermore, with the advent of environmental monitoring technologies - such as GIS and Remote Sensing - that allow environmental data sets to be easily combined, overlaid, and analyzed the acquisition and archiving of *digital spatial environmental data* is strongly encouraged and preferable. Aside from spatial data, environmental data also includes *non-spatial environmental data* sources such as national, regional, and local socio-economic, social, and biophysical data (e.g. population, crop yield, sediment loads, pollution levels, and social explanations on environmental change).

### II.A.ii. Types of environmental data in Malawi

Malawi is in the process of developing an extensive environmental data infrastructure particularly with regard to digital spatial data. The Malawi environmental data infrastructure at present consists of the following environmental data at a national coverage:

#### II.A.ii.a. Spatial environmental data:

- development of 1:50,000 digital topographic digital series at a national coverage (e.g. roads, rivers, contours, villages, and national parks);
- development of 1:250,000 topographic digital series (e.g. roads, rivers, contours, villages, and national parks);
- development of 1:250,000 LREP Soils digital series;
- archived 1994 Landsat TM imagery at a national coverage (for 30m land cover mapping) (DOS, DOF, and Lands);
- archived 1984 Landsat TM imagery (for 30m land cover mapping) (DOS, DOF, and Lands);
- archived monthly 7.6km NDVI Vegetation Index images from 1981 – present at a national coverage (for routine regional land cover change assessment) (DOS, DOF, and MET);
- archived monthly 3km NDVI Vegetation Index (MET);
- archived Advanced Very High Radiometer Resolution (AVHRR-HRPT) 1km imagery (DOFH);
- monthly Rainfall Surface maps from station data;
- monthly Cold Cloud Duration (CCD) data at a national coverage (for rainfall mapping);

- archived Famine Early Warning Systems (FEWS) agricultural production, socioeconomic, and vulnerability data;
- select SPOT images (for 10m/20m resolution land cover mapping);
- archived Public Land Utilization in Zomba, Dzalenyama, Liwonde, and Mulanje; and
  - land cover and land cover change (1984-1994)
  - resource utilization
  - population density
  - soil erosion potential
- archived Shire investigation data in Lisungwe, Lisanjali, and Rivi-Rivi watersheds.
  - land cover and land cover change (1984-1994)
  - soil erosion potential

II.A.ii.b. Non-spatial environmental data:

- Sediment loads at select rivers and other DOW data ????
- Crop yields/ Lands and D. of Stats??/
- Census data/ D. of Stats???
- Health/DOH and other socio-economic data????
- local-level socio-economic data from district officers, NGOs, District offices???
- species data (flora and fauna)??? - National parks
- pollution data??
- data archived at the documentation unit (National Research Council - Chuma)???
- Public Land Utilization in Zomba, Dzalenyama, Liwonde, and Mulanje
  - resource utilization
- Shire investigation data (Lisungwe, Lisanjali, and Rivi-Rivi watersheds)
  - explanations for underlying social causes for environmental change

ELABORATE (get data from the Dep't of Stat., local level non-spatial data - possibly compiled through the census, Institute of Social Research??)

### II.A.iii. Developing capacity to maintain an environmental data infrastructure in Malawi

Developing a sustainable in-country environmental data infrastructure is concerned not only with the acquisition and archiving of environmental data, but more importantly building capacity in human, technical, institutional, and financial resources to ensure the maintenance and continuation of *routine* environmental data acquisition and archiving. Clark University and the University of Arizona have been involved in a number of efforts to build capacity in developing in-country capacity to maintain *routine* environmental data acquisition and archiving. These efforts include developing human, technical, institutional, and financial resources in in-country environmental data acquisition and archiving as indicated below.

#### II.A.iii.a. Human resources development in environmental data acquisition and archiving

- Trainings in GIS, Remote Sensing, and GPS involving institutions with the mandate to acquire and archive environmental data (e.g. DOS, DOF, Lands, MET, and UNIMA)
  - 4 annual cycles in environmental monitoring trainings have been given to date in which each annual cycle has consisted of an introductory, intermediate, and advanced session (to date a total of 11 sessions have been given)
  - approximately 70 individuals have been trained over the past four years
- Specialty sessions in map accuracy assessment (e.g. DOS, DOF, Lands, MET, and UNIMA)
- Specialty sessions in map digitizing (DOS, DOF, Lands, MET, and UNIMA)
- Specialty sessions in spatial environmental data acquisition and archiving:
  - Department of Surveys
    - Digital data standard development
    - Digital data archiving
    - Digital map production
  - Department of Forestry
  - Department of Lands (Ministry of Agriculture)
  - Meteorology Department
  - UNIMA
- Specialty sessions in the collection of data on siltation/soil erosion (YUSUF with DOW...)
- Specialty sessions in non-spatial environmental data acquisition and archiving (ELABORATE UofA)
  - EAD/NRC in developing a documentation unit
  - UNIMA (libraries??) on non-spatial data archiving (Uof Arizona - ELABORATE...)

II.A.iii.b. Technical resources development in support of environmental data acquisition and archiving:

- Provision of GIS hardware to institutions mandated to acquire and archive environmental data (e.g. DOS, DOF, Lands, MET, EAD, UNIMA)
  - computers, digitizers, large format printers, CDR writer, plotters and scanners
- Provision of GIS software
  - IDRISI, Arc/Info, ArcView
- Provision of Image Processing Software
  - Microsoft Word, Excel, Powerpoint
- Provision of GPS hardware and processing software
  - Trimble
- Provision of equipment of collect information on siltation and soil erosion (at DOW????)
  - ELABORATE???

II.A.iii.c. Institutional resource development in environmental data acquisition and archiving:

- Capacity building efforts have focused on institutions with the mandate to acquire and archive environmental data such as the DOS, DOF, Lands, MET, and UNIMA
- Assistance has been provided on the development of environmental data infrastructure coordinating bodies such as the:
  - National Mapping Programme (e.g. on developing data standards)
  - Malawi GIS Committee/Professional Society (MAGIC)
  - National Research Council Documentation Unit (UofA- ELABORATE)
  - Environmental Affairs Information Dissemination Unit (??? - UofA - ELABORATE)

II.A.iii.d. Financial resource development

- provided through primarily USAID
- local currency funds (e.g. DOS funds to develop 1:50,000 and 1:250,000 digital map series for which significant demand exists)

#### II.A.iv. Recommendations to continue to develop and maintain an environmental data infrastructure in Malawi

Given the dynamic nature of the environment developing an environmental data infrastructure requires *routine* updating of the various core environmental data (e.g. the *routine* acquisition, and archiving of land cover, rainfall, soil erosion, crop yields, population, and income data). While Malawi presently has a rather extensive environmental data infrastructure, it is critical that the further development of the Malawi EIS continues to emphasize that core environmental data sets are *routinely* updated and evaluated. Following are recommendations for the continued development of an environmental data infrastructure in Malawi with particular regard to the need to support *routine* environmental data acquisition and archiving.

There is a need to develop a long term national environmental data policy and strategy in Malawi that outlines institutional responsibility to:

1. (Spatial and non-spatial data) *routinely* acquire and archive environmental data (e.g. monthly land cover data and annual land cover change assessment at DOF, monthly agricultural data and annual soil erosion data at Lands, and monthly rainfall data at MET). It is envisioned that this activity will strongly support the development of a annual/biannual (??) State of the Environmental Report (SOER) in Malawi.
2. (Spatial data) to provide guidance on national data standards (e.g. through the National Mapping Programme, DOS, and MAGIC). This includes guidance on:
  - data exchange guidelines
  - distribution procedures;
3. (Spatial and Non-spatial data) continue conducting training sessions in specifically data management to ensure that environmental data is *routinely* archived and retrievable (specifically sessions/trainings may be split into spatial and non-spatial data/information management sessions with involvement of DOS, DOF, MET, Lands, UNIMA DOW, Dof Stats, UNIMA, EAD, Inst. of Social Research, and NGO's.
4. (Spatial and Non-spatial data) develop a national environmental data catalogue (that includes both spatial and non-spatial digital and non-digital environmental data); and
5. (Non-spatial data) strengthen capacity (human, technical, institutional, and financial resources) to acquire and archive regional and local level environmental data - particularly non-spatial data (e.g. through D. of Stats, Lands extension, DOF extension, DOW extension, NGO's, Institute of Social Research, district officers??, ).

## II.B. Developing Environmental Information Analysis in Malawi

### II.B.i. Description of environmental information analysis activities

As indicated in Figure 3, developing environmental analysis capacity includes:

1. coordinating *routine* national-level environmental analysis (drawing on in-country expertise such as from the DOF, Lands, UNIMA, MET, EAD, D. of Stats, and EAD);
2. coordinating *routine* sessions (e.g. with a decision support structure) to prioritize national environmental concerns and “environmental hot spots” based on biophysical and social/environmental assessments (see section II.C on decision support activities);
3. coordinating multidisciplinary environmental analysis that spans biophysical and social assessments for both immediate and recurrent environmental concerns;
4. recommending *routinely* mitigation strategies;
5. disseminating mitigation recommendations to a senior level decision support structure;
6. coordinating trainings in biophysical analysis (e.g. in using environmental monitoring technologies);
7. coordinating trainings in participatory approaches/social analysis; and
8. developing curriculum in environmental studies that include biophysical and social sciences.

### II.B.ii. Types of environmental information analysis in Malawi

#### II.B.ii.a. Sector specific analysis

Environmental data in Malawi has to date primarily been used for sector specific analysis that include:

- DOF use of environmental data for:
  - Forest inventory
  - Reserve monitoring
  - Change analysis
- Lands (Agriculture) use of environmental data for:
  - Estate mapping
  - Land cover mapping
  - Change analysis
  - Soil erosion modeling
- MET use of the environmental data for:
  - Rainfall surface mapping using interpolation from station data and Cold Cloud Duration (CCD) data
  - El Nino monitoring and prediction  
(information distributed through a monthly MET bulletin)
- DOW use of the environmental data for:
- ????
- D. of Statistic use of the environmental data for:

- ?????

- National Parks

- ?????

*II.B.ii.b. Collaborative environmental analysis*

While collaborative environmental analysis is new to Malawi - as it is to so many other countries - Clark University and the University of Arizona have provided assistance to build capacity in multidisciplinary environmental analysis through the development of various environmental investigations. These investigations have focused on using a collaborative approach to include the participation of individuals from UNIMA, Lands, EAD, DOF, DOS, MET, D. of Statistics, DOW, Institute of Social Research, Agricultural Research Policy Unit (APRU), NGO's, extension, district officers, and village community members. These environmental inquires have included the:

- Shire investigation on siltation of the Shire river<sup>1</sup> (institutions that have been involved include the UNIMA, DOF, EAD, Lands, DOW, DOS, MET, Institute of Social Research, extension, village chiefs, and village community members)
  - the Shire study has focused on gaining a better understanding of the underlying causes of siltation in the Shire river by investigating:
    - where land cover change and soil erosion is taking place and
    - what the underlying causes of land cover change are (both biophysical and social explanations of environmental change)
- Public Land Utilization Study (ELABORATE) (this collaborative environmental investigation has included the participation of DOF, EAD, Lands, D. of Stats, APRU (??), DOW, extension, district officers, NGO's, village chiefs, village community members....)
  - ELABORATE
- Environmental impacts of market liberalization of burley tobacco in Malawi (ELABORATE) (this collaborative investigation has included the participation form Lands, DOF, MET, EAD,....)
  - ELABORATE

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<sup>1</sup> Two turbines on the Shire river - at Nkula-Tedzani and Kapicihira falls - provide 90% of the national electricity supply. The siltation of the Shire river has resulted in an unstable national electricity supply.

II.B.iii. Developing capacity to maintain in-country  
environmental analysis in Malawi

Developing sustainable in-country environmental analysis is concerned not only with conducting actual environmental analyses as discussed above, but more importantly entails building in-country capacity to *routinely* analyze environmental data/issues in Malawi. Clark University and the University of Arizona have been involved in a number of activities to develop in-country human, technical, institutional, and financial resources in environmental analysis as listed below.

II.B.iii.a. Human resources development in in-country environmental analysis:

- Curriculum development in the environmental sciences at the UNIMA (University of Malawi);
- Development of UNIMA small grants in support of environmental research;
- Training in geographic analysis using GIS, Remote Sensing and GPS (also see section II.A.iii.a.)
  - the trainings have included geographic analysis sessions on:
    - land cover change assessment
    - environmental modeling (e.g. soil erosion modeling)
  - these trainings have consisted of 4 annual cycles consisting in which each annual cycle has consisted of an introductory, intermediate and advanced sessions
  - approximately 70 individuals trained (incl. approx. 6 UNIMA staff/professors)
- Training of trainers (e.g. UNIMA staff) in geographic analysis and environmental monitoring using GIS, Remote Sensing, and GPS
- Specialty sessions in Rapid Rural Assessment/Participatory Rural Assessment
- Specialty sessions in Ground Truthing procedures
- Agency Specific Project Assistance (see “types of environmental analysis”
- DOF, Lands, MET, EAD, DOS, and UNIMA (Bunda, Polytechnic, and Chancellor)

II.B.iii.b. Technical resource development in-country environmental analysis:

- Provision of GIS hardware to agencies mandated to analyze environmental data (UNIMA, DOF, Lands, MET, EAD, DOS) (also refer to section II.A.iii.b.)
  - computers, digitizers, large format printers, CDR writer, plotters and scanners
- Provision of GIS software
  - IDRISI, Arc/Info, ArcView
- Provision of Image Processing Software
  - Microsoft Word, Excel, Powerpoint
- Provision of GPS hardware and processing software
  - Trimble

II.B.iii.c. Institutional resource development in environmental analysis:

- Building in-country capacity in environmental analysis involving institutions mandated to conduct environmental analysis such as UNIMA (Bunda, Polytechnic, Chancellor), DOF, EAD, Lands, MET, DOS, and DOW and to some extent NGOs, extension services (at DOF, Lands, and MET), Institute of Social Research (Chancellor), and APRU (Agricultural Policy Research Unit).
- Assistance has been provided to develop a coordinating body/forum for environmental analysis including:
  - assistance on the development of an environmental analysis unit
  - the UNIMA Curriculum program
  - the Environmental Monitoring training program
  - MEMP coordination in environmental investigations

II.B.iii.d. Financial resource development

- USAID
- Local currency funds

II.B.iv. Recommendations to continue to develop and maintain  
environmental information analysis activities in Malawi

Recommendations to continue developing capacity in environmental analysis in Malawi are listed below.

1. There is a need to continue to devise a long term strategy and policy to develop a coordinated environmental analysis forum/body in Malawi that draws on existing in-country expertise to *routinely* conduct environmental analysis. In the initial phases, it is recommended that such an environmental analysis forum/body is actively involved in conducting national-level environmental analysis in support of the production of Malawi's State of the Environmental Report (SOER). It is envisioned that such a SOER include information on national-level "environmental hot spots" as well as community and regional-level "environmental hot spots"(see section II.C). Aside from *routine* environmental assessment (e.g. annually/biannually), it is envisioned that the environmental analysis forum/body will be answerable to an environmental senior-level decision support body that may request specific environmental queries as they arise. (POSSIBLY REFER TO A FIGURE HERE INDICATING MANDATE OF ENV. ANALYSIS UNIT AN INFO FLOWS.....)
2. (Biophysical environmental analysis) There is a need for a larger pool of in-country environmental analysts. Continued capacity will need to be built in support of biophysical and social environmental analysis. With the development of an environmental forum/body, it is recommended that specific trainings and technical assistance is particularly provided to the collaborative environmental forum (see #1 above).

3. (Biophysical analysis) There is a need for *routine* sector specific environmental analysis in the DOF, Lands, MET, and DOS. While sector specific environmental analyses have been conducted in GOM institutions, these analyses have to date not been conducted *routinely*.
4. (Social analysis) There is a need to further develop capacity (human, technical, institutional, and financial resources) in social analysis including in community based participatory approaches and methodologies . This requires the development of a long term strategy to build and support existing institutions mandated to conduct social environmental analyses such as UNIMA, NGO's, district offices, the Institute of Social Research, and extension services (from Lands, DOF, D. of Statistics, MET, and DOW).
5. (Social analysis) There is a need for continued UNIMA curriculum development in the environmental studies (particularly with regard to the social sciences).

## II.C. Developing decision support activities in Malawi

### II.C.i. Description of decision support activities

Decision support activities are specifically focused on linking environmental information users and producers towards improving environmental management. As indicated in Figure 4, decision support includes such activities as:

1. identifying existing and potential environmental information users;
2. coordinating and conducting routine environmental information needs assessments (at the national, regional, and local levels);
3. giving input on regional and local environmental information needs and “environmental hot spots” (see section II.B. on environmental analysis);
4. prioritizing with the collaboration of other relevant stakeholders environmental information needs;
5. disseminating environmental information needs to an environmental analysis forum/body and participating data infrastructure institutions;
6. proposing final mitigation strategies based on recommendations (including short and long term environmental mitigation strategies, for example including the support of community based extension and development of an environmental trust fund);
7. supporting and disseminating environmental data, information, and mitigation strategies to end users (e.g. through awareness building campaigns); and
8. supporting the development of environmental policies and initiatives.

### II.C.ii. Types of decision support activities in Malawi

Decision support activities in Malawi have to date primarily included the development of a number of separate initiatives such as the development of:

1. environmental legislation (list policies and environmental regulations, EIA, development of Malawi NEAP, ELABORATE- Uof A- Tony);
2. an environmental support fund (list, ELABORATE- Uof A- Tony);
3. in-country extension services within such institutions as Lands, DOF, DOW, D. of Statistics - albeit underfunded;
4. in-country linkages between village communities, district offices, and national government - - albeit weak (ELABORATE...);
5. in-country environmental awareness programs (e.g. at DOF, Lands, DOW);
6. in-country environmental committee such as the National Committee on the Environment (NCE) and Technical Committee on the Environment (TCE), ELABORATE, UofA, Tony); and
7. microprojects and other district/community level environmental initiatives/projects (PLUS, Shire investigation, etc ..... ELABORATE - UofA).

II.C.iii. Developing capacity to maintain decision support activities in Malawi

Few activities have to date addressed developing a sustainable decision support structure in Malawi. Some disparate activities have been indicated below.

II.C.iii.a. Human resource development in decision support activities

- building capacity in extension services- albeit underfunded???? ELABORATE
- building capacity in environmental legislation?????
- building capacity in developing environmental support funds/trusts?????

II.C.iii.b. Technical resources development to maintain decision support activities

- allocation of resources to extension (e.g. materials and equipment - cars)?????
- ELABORATE

II.C.iii.c. Institutional development to maintain decision support activities

- developing the NCE and TCE
- developing the Malawi NEAP
- ELABORATE?? development of district initiatives ??? (ask Dick)

II.C.iii.d. Financial resources development to maintain decision support activities

- USAID
- local currency funds

???ELABORATE

II.C.iv. Recommendations to continue to develop and maintain decision support activities in Malawi

There is a need to coordinate and strengthen decision support activities so that environmental information users and producers at the national to local level are more adequately linked (see recommendations under II.C.iv). Furthermore, there is a need strengthen community based environmental strategies in which national funds are more effectively used and funneled to support activities focused on community-level extension and support (e.g. community based reforestation, soil erosion conservation, and educational programs). Recommendations to strengthen the decision support structure include the following:

1. further developing a national environmental support/trust fund and strategies to adjust the fund to encourage environmental action in “environmental hot spot areas” (ELLABORATE);
2. strengthening existing community-based extension services (e.g. through Lands, DOF, DOS, DOS, DOH);
3. strengthening long term strategies to deal with environmental degradation (e.g. supporting family planning programs and education programs that provide parents incentive to keep their children in school longer);

4. developing a high-level decision support committee (possibly within the NCE) mandated to:
  - conduct *routine* forums with the environmental analysis forum/body (see section II.B.) and other relevant stakeholders to prioritize environmental information needs and issues (e.g. prioritization of “environmental hot spots”)
  - allocate *routinely* national funds for the support of environmental information usage and mitigation (e.g. *routine* allocation of national funds for in support, for example, community based reforestation and soil conservation within select “environmental hot spots”)
  - coordinate and conduct *routinely* (e.g. annual) environmental information dissemination sessions with relevant stakeholders (e.g. GOM, district officers, village chiefs, and private companies)
  - support awareness building on environmental issues, environmental support funds, and extension
  - develop a long term strategy to maintain environmental decision support in Malawi;
5. developing a mid-level coordinating decision support body/forum (e.g. to possibly work within Malawi’s existing extension service and/or other relevant institutions) mandated to:
  - identify existing national, regional, and local environmental information users;
  - conduct a *routine* local to regional environmental information needs assessment (e.g. in collaboration with existing extension services offered by Lands, DOF, MET, and DOST); and
  - disseminate environmental data, information, and mitigation strategies to end users (e.g. through extension and awareness building campaigns)

NEEDS TO BE ELABORATED/EDITED - check with CBNRM proposal, Program Evaluation (1998), Dick Ford’s suggestions .....

## II.D. Developing EIS oversight in Malawi

### II.D.i. Description of EIS oversight activities

EIS oversight activities entails the oversight and monitoring of the development of EIS-related activities towards its ultimate goal to provide and use environmental information to improve natural resource management. As indicated in Figure 5, EIS oversight includes overseeing the technical, human, institutional, and financial needs of the national EIS.

### II.D.ii. Types of EIS oversight activities in Malawi

The oversight of the Malawi EIS has to date been minimal since its development has only been recently approved by the GOM (EIS Design Team, 1997),. There have, however, been a number of contributions towards the development of the Malawi EIS including:

1. recommendation on the development of an EIS by Eastman, Toledano, and Hutchinson (1994);
2. the EIS Design Team report on the development of an EIS in Malawi with particular regard to developing a prototype study on the Shire investigation; and
3. discussions on EIS-related activities with participating agencies (DOF, Lands, DOS, MET, and EAD).

EIS-related activities in Malawi to date has not included the *formal* development of an EIS committee (see recommendations in section II.D.iv).

### II.D.iii. Developing capacity to maintain EIS oversight activities

Since developing an EIS in Malawi has only been recently approved (EIS Design Team, 1997), little effort has gone into developing capacity to support its oversight. Various recommendations have been made in the subsequent section (II.D.iv) to strengthen capacity in support of overseeing EIS-related activities.

### II.D.iv. Recommendations to continue to develop and maintain EIS oversight activities in Malawi

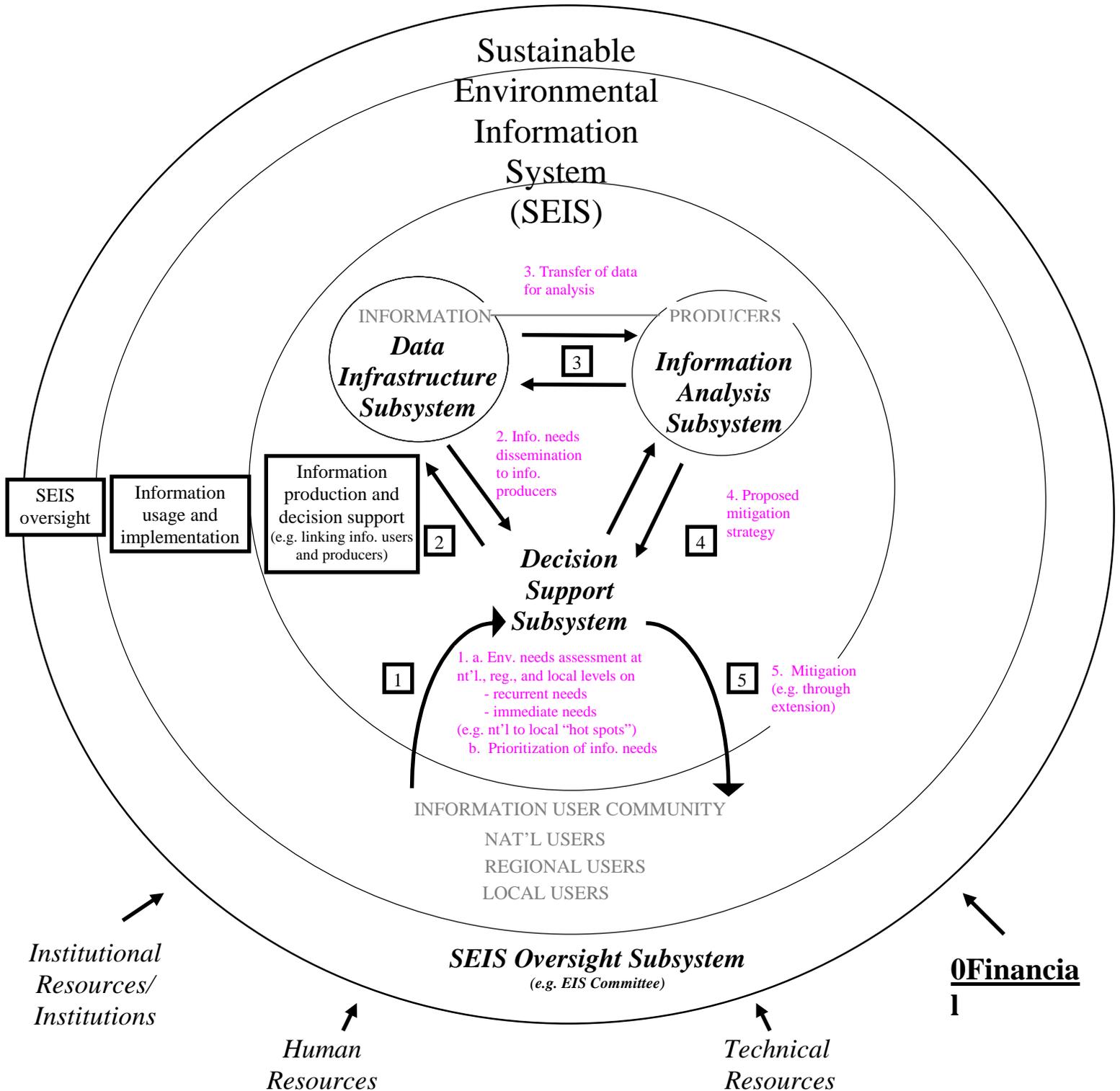
To date a *formal* national EIS committee does not exist to oversee the development of the Malawi EIS. It is recommended that an EIS committee is created to consist of representatives from various relevant senior and mid-level institutions such as the NCE, TCE, GOM (incl. extension), NGO's, UNIMA, district officers, and community/village based organizations. It is recommended that an EIS committee is developed with the following mandate:

1. to oversee and monitor EIS-related activities and needs (e.g. technical, human, institutional, and financial needs) including the development of an environmental data infrastructure, environmental information analysis capacity, and decision support;
2. to conduct awareness building sessions on EIS with relevant institutions and stakeholders;
3. to *routinely* report (e.g. annually) on the progress (efforts and gaps), needs, and recommendations towards further strengthening the Malawi EIS (e.g. report to the decision support structure); and
4. to develop a national Malawi EIS policy outlining institutional capacity, mandates, and job descriptions towards sustaining an environmental data infrastructure, environmental information analysis, and decision support in which environmental information may be used and produced to ultimately improve natural resource management in Malawi.

### **List of abbreviations**

DOF	Department of Forestry
DOS	Department of Surveys
MET	Meteorology Department
Lands	Department of Lands (Ministry of Agriculture)
EAD	Environmental Affairs Department
NRC	National Research Council
DOW	Department of Water
DOFH	Department of Fisheries
DOH	Department of Health
DOS <sub>t</sub>	Department of Statistics
UNIMA	University of Malawi
GOM	Government of Malawi
FEWS	Famine Early Warning System
NEAP	National Environmental Action Plan
NCE	National Committee on the Environment
TCE	Technical Committee on the Environment
SOER	State of the Environment Report
PLUS	Public Lands Utilization Study
EIS	Environmental Information System
NGOs	Non-governmental Organizations
USAID	United States Agency for International Development

**Figure 1:** Conceptual framework of a Sustainable EIS (SEIS).



**SEIS Subsystems** (i.e. Decision Support, Data Infrastructure, Information Usage, EIS Support)  
**SEIS Inputs** (i.e. Human, Technical, Financial, Administrative/Management resources)  
**SEIS ACTORS** (i.e. INFORMATION USERS AND PRODUCERS)

SEIS  
LEVELS

Figure 2

# Data Infrastructure Subsystem (DIS)

NOTES  
 Contributions:  
 Malawi, phase I  
 Prevost and Gilruth,  
 1997  
 GRID, 1985,1992

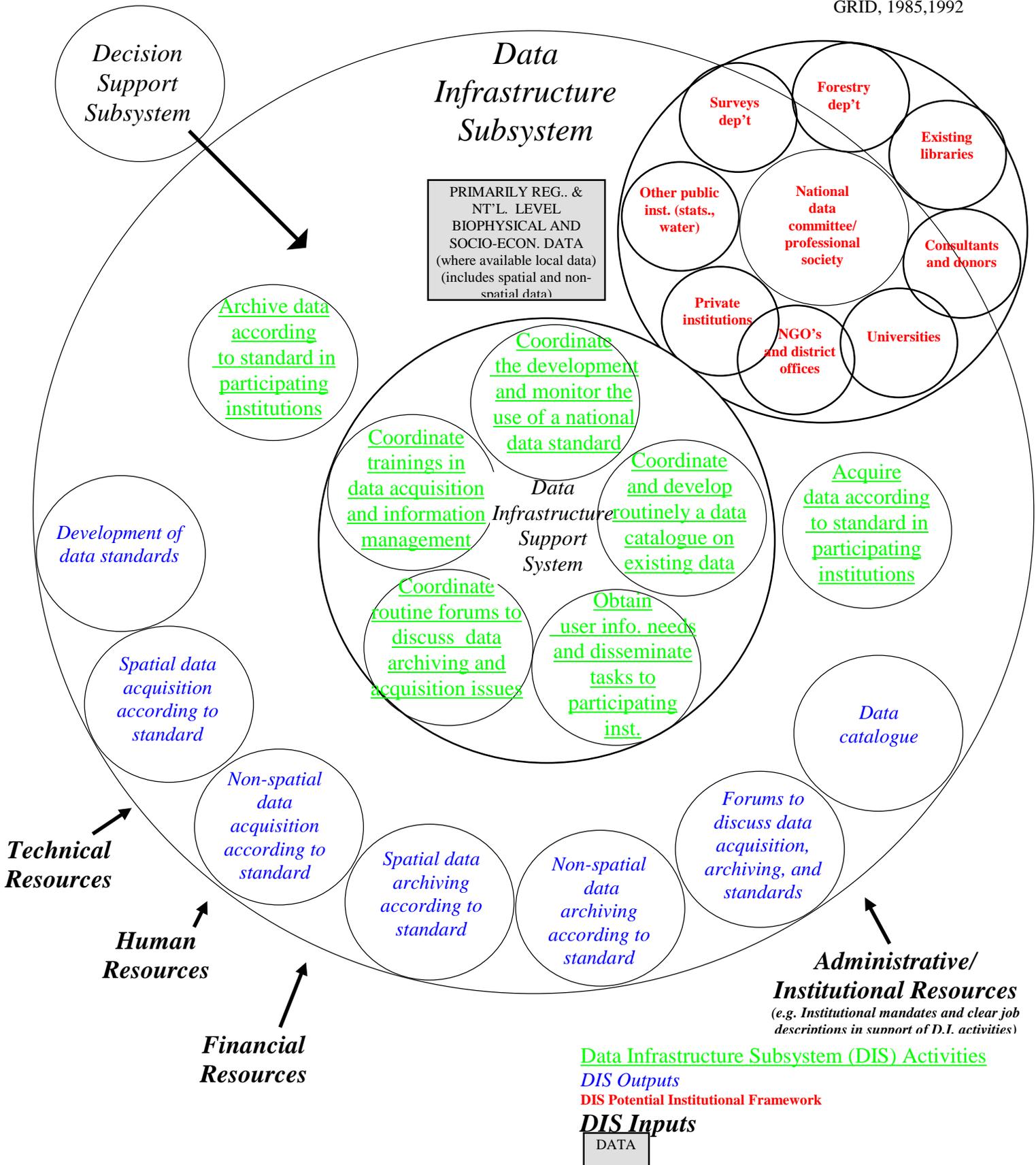
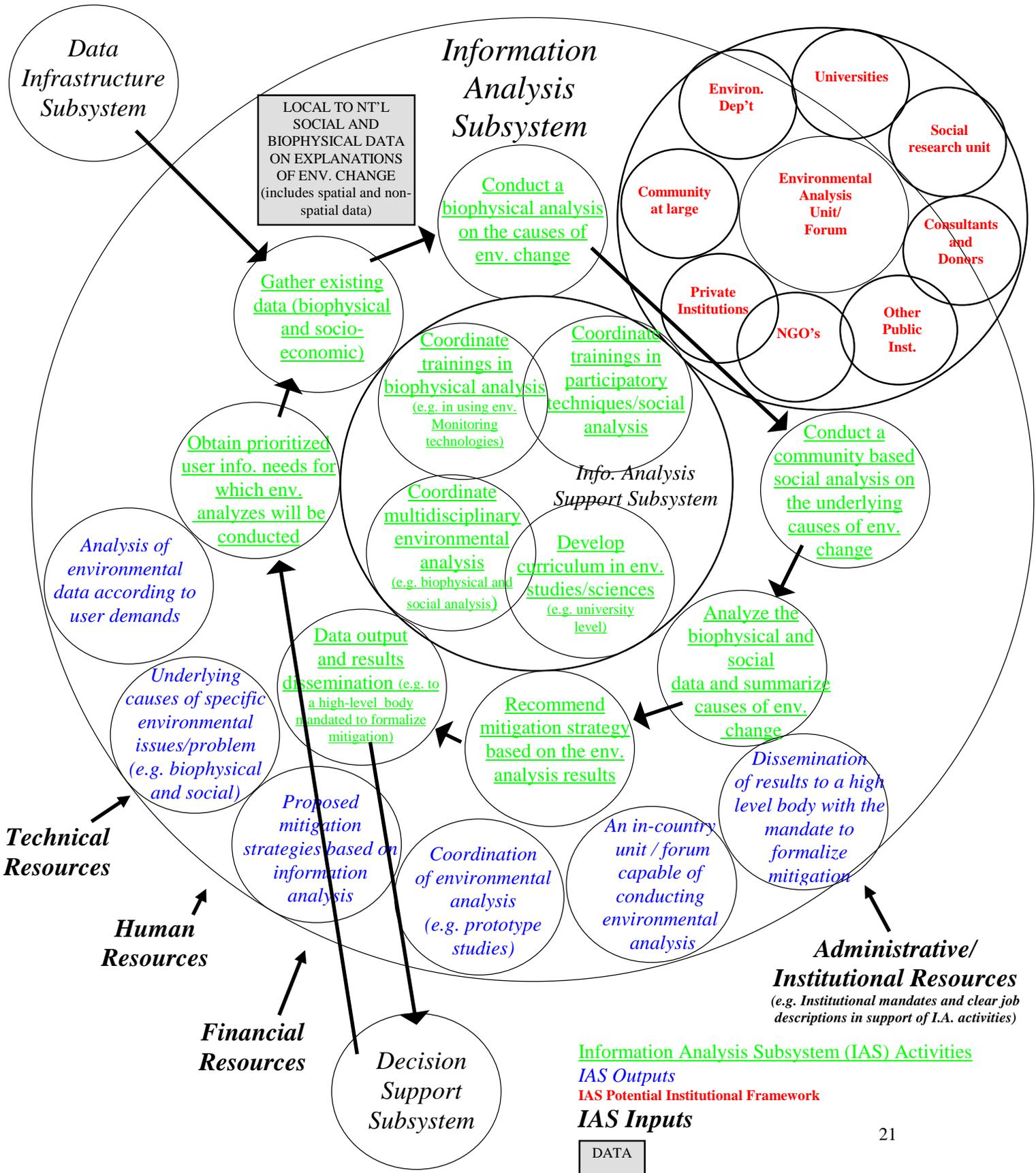


Figure 3

NOTES  
Contributions:  
Malawi, phase II

# Information Analysis Subsystem (IAS)



**Figure 4**

NOTES  
 Contributions:  
 Malawi, phase III  
 UNSO, 1991  
 Falloux, 1989

# Decision Support Subsystem (DSS)



**Decision Support Subsystem (DSS) Activities**

*DSS Outputs*

**DSS Potential Institutional Framework**

**DSS Inputs**

**Figure 5**

## SEIS Oversight Subsystem (SEISOS)

