

CAPACITY-BUILDING WITHIN IMBER Proposed Implementation Strategy

Objectives:

- To enhance research capabilities in less developed countries especially those geographically close to regions of interesting biogeochemical/ecosystem provinces for optimal implementation of the IMBER science plan.
- To enhance research capabilities globally in those IMBER activities that have few practitioners but are crucial for optimal implementation of the IMBER science plan.
- To strengthen graduate education in ocean sciences

Scope and Rationale:

Given the global scope of IMBER, capacity building measures directed at less-developed countries will bring global benefits through access to sites and information exchange. Realistically, we cannot involve all countries of the world in IMBER activities. Therefore, we should primarily target those countries that have some already existing infrastructure and human resources, further taking into account their strategic location for understanding the processes of interest to IMBER. Recognizing that key individuals can sometimes galvanize national and regional research efforts, opportunities for collaborative research should be afforded to individuals from such countries.

Capacity building measures should be context- and country (region)-specific. The focus of IMBER capacity measures should be interdisciplinary emphasizing linkages within global change sciences and society responses. Finally, capacity building is an important activity of various other ongoing projects as well, including those supported by SCOR and IGBP. A coordination of our activities with these efforts is essential for optimal resource utilization.

PROPOSED COMPONENTS OF IMBER CAPACITY-BUILDING EFFORT

Encourage new research initiatives and establish/improve infrastructure needed for IMBER-related research in less developed coastal countries:

This is the most important but also the most difficult task because oceanographic research requires expensive infra-structure, especially the seagoing facilities, which many less-developed countries cannot afford on their own. Scientists from these countries face a lack of access to equipment and research funding as well as recent literature, and are therefore often isolated from the global scientific community. The primary way these constraints can be overcome is through **networking** – both regionally and globally. This will facilitate the establishment of enabling environment to promote capacity-building measures within the scope of IMBER Science.

Regional networking should be targeted on:

- Those countries that already have some financial and/or human resources and where modest help can yield quick and substantial returns (countries in the Middle-east, Southeast Asia, Northeast and Southwest Africa, South America)
- Geographical areas of special interest to IMBER that are remote from the developed world.

Capacity-building networking may be achieved through a number of mechanisms such as information exchange, specific training workshops and Web-based training, collaborative cruises, and scientific exchange visits. Utilization of existing and formulation of new **regional programmes** with lead provided by the more advanced

countries in the region should among other measures become a part of regional networking. Some already established networks and ongoing programmes that must be linked with are POGO, GOOS, START, LOICZ, CLIVAR, MARBEF, UNESCO Floating University, NATO ASI and ARW. Spell out acronyms in full here.

Information exchange within the network should be achieved through a dedicated IMBER web portal comprising among other topics information about capacity building measures. Web portal of the European network of excellence MARBEF (www.marbef.org) provides one of the successful examples. Smooth information flow on capacity building initiatives that fall within the scope of IMBER must be ensured. It is recommended that a record be kept of capacity-building activities under IMBER, with a register of participants, to allow possible future analysis of efficacy of such activities.

Human resource development

IMBER is committed to encourage full participation of undergraduate and graduate students, who will gain experience with interdisciplinary studies and system approaches to ocean science. It places a priority on professional training for the next generation of college and university faculty, in both developed and developing countries, who will transfer this new understanding to their students and colleagues. The knowledge developed in the IMBER project can be used to strengthen curricula related to the sensitivity of the ocean to global change from primary school to university level.

Education and training of scientists from the less-developed countries in emerging cross-disciplinary and integrative approaches recommended by IMBER is a critical component of capacity building. The goal should be to promote scientific activities beyond the "critical mass" needed to address the IMBER-related research questions. This could be done through:

- Two-way exchange of researchers between developing and developed countries availing existing Fellowships/Visiting scientist programmes of international bodies such as TWAS, START, Nippon foundation-POGO, IAI, spell out etc. However, many researchers from developing world are not aware of the existence of such fellowships, so a compilation of the available opportunities will be helpful. Additional exchanges of both students and faculty can be effected through inter-institutional programmes. Two models of such exchanges are the ongoing joint programme between University of Concepcion, Chile and Woods Hole Oceanographic Institution, USA (http://www2.udel.edu/oceanoudec/contenidos/index_ingles.html), and several bilateral projects that the Institute for Marine Tropical Ecology in Bremen, Germany, has with institutions in developing countries (<http://www.zmt-bremen.de/files/main.php?language=en&a=inst&deep=1&b=InPart>).
- Organization of Workshops, Summer schools, etc.: The ongoing activities/infrastructure must be made use of. Special attention is needed for imparting training on those aspects where the expertise is lacking not only in developing countries but also in many developed countries (e.g. biogeochemical and ecosystem modeling).
- Close communications with the IMBER Working Groups is essential for organizing these courses. The Workshops should tackle specific regional or topical problems and should be result-oriented (i.e. lead to scientific publications). Graduate students, post-docs and junior scientists should be targeted and identified for networking among themselves and with established scientists who should serve as mentors and undertake joint research projects.

- Web-based interactive courses and distance-learning programmes (probably degree-earning) within the scope of IMBER thematic areas would greatly help in regions with easy Internet access.
- Opportunity for participation in IMBER cruises organized by developed country scientists: This is essential to providing hand-on experience and exposure to the state-of-the art research. The information about such cruises should be publicized through Newsletters.

Capacity building measures for developed countries

One of the most challenging tasks before IMBER that distinguishes it from the other international projects is the real integration of the biogeochemical and ecological research. Means to achieve this objective (e.g. end to end modeling) are not easily available even in the developed countries, and so considerable capacity building efforts are needed in this regard. Capacity gaps in individual IMBER thematic areas should be addressed via scientific exchange visits, sabbatical leave, short-term technical training etc. For this purpose several US and European institutions with strong scientific record in IMBER-related disciplines should be selected and respective agreements concluded. Not sure what is meant here? They may also be a part of learning centres used for training of specialists from developing countries.

Seek special funding for Capacity building-related activities

The initiatives listed above will require substantial financial and human resources even if the reliance is primarily on the already existing infrastructure. In addition to the traditional sources (e.g. national/regional funding agencies, African Union, ASEAN, APN, UNDP, UNEP, World Bank, ADB, OAS and AFDB sponsorships from private sector should be sought. Spell out.

Implementation

Going by the premise that capacity building is to be achieved largely through regional research initiatives, the implementation of the capacity building plan is closely linked to the implementation of IMBER itself in various regions of the world. Identification of such regional programmes, and of key participating countries, institutions and persons will therefore be of paramount importance. One such initiative is already underway in the Indian Ocean region, most rim countries of which still have rather primitive infra-structure and very limited resources for oceanographic research, but where the biogeochemical processes are of global interest and implications. This initiative, called SIBER (Sustained Indian Ocean Biogeochemical and Ecological Research; (<http://ian.umces.edu/index.html?http&&ian.umces.edu/siber/>)) aims at formulating a plan for the implementation of a biogeochemical and ecological observational and modeling research programme that leverages and substantially enhances the planned CLIVAR/GOOS Indian Ocean observing system. All efforts are being made to involve scientists from the Indian Ocean Rim countries in this activity.

Capacity building, of course, cannot be confined to, or achieved only through, regional programmes; instead it should be addressed as an item in all planned IMBER activities, in a manner that is most appropriate for that activity. It is, therefore, necessary to ensure that one or more of the above proposed actions are implemented in the IMBER activities.

It is recommended that a Capacity Building Working Group be formed, with terms of reference to include:

- initiating, promoting and overseeing capacity building activities within IMBER where possible
- ensuring synergy between capacity building measures implemented by IMBER working groups
- ensuring synergy between capacity building measures implemented by IMBER and other international projects
- identifying existing training avenues/opportunities (Fellowships/Workshops/Summer schools etc) and possible sources of funding of future IMBER-specific initiatives
- ensuring that opportunities for capacity building are recognized and used in IMBER-specific activities where possible
- ensuring that capacity building remains an integral component of implementation within IMBER, perhaps by identifying and promoting a specific research theme that will develop capacity that currently does not exist in some regions.