

What can one say, in a very short time, about where EuroMAB and Biosphere Reserves are today, and how do they fit into our concerns and activities about how we manage the planet and societies?

I will try, from my own experience and biases, to touch on five aspects:-

- give a bit of the background to UNESCO, MAB, and Biosphere Reserves. Even though many of you know it well, it is good, if we are thinking about our problems and opportunities today, to remind ourselves how the concepts developed, what were the reasons, scope, and expectations, and how relevant are they to current issues;
- think a bit about what has happened and changed, related to Biosphere Reserves and later to EuroMAB, from 1970 to 2013;
- EuroMAB today and its place in the U.N. system and in national and local issues;
- Reflect a little on the results and effectiveness of what we have done and are trying to do;
- Point out some gaps and areas where EuroMAB could make a stronger positive contribution, and which seem to me to need attention, and make some suggestions.

This is an enormous, complex set of topics, and are the subjects of many conferences and books; but let me try to say something useful in the context of this meeting. My comments will of course be very incomplete; I apologize in advance if some of them seem to some of you to be distorted or very biased.

Historical Background

When, at the close of the Second World War, leaders of governments of several nations determined that there should be an organization of governments to deal with political and territorial disputes without resort to military arms, the United Nations Organization was founded. It is worth remembering that the UNO was an association of governments, not of nations themselves, and was planned to deal with strictly political issues. During the 1950's, however, the problems dealt with became seen to affect entire nations; the UNO came to be organized simply as the United Nations, and a U.N. Charter was developed which stated

that the members promoted and cared for the well-being of all citizens of the nations.

As the UN developed, it spawned a number of international institutions or organizations to carry out activities under the Charter. As these progressed, there was seen to be a need for a vehicle to co-ordinate and give attention to the role of science and education in international discussions, and to give attention to the diversity of cultures and values that provided the basis for many of the topics properly dealt with by the United Nations. Accordingly, after a great deal of discussion, in 1958 the UN General Assembly gave approval to a new organization which became known as the

United Nations Educational, Scientific and Cultural Organization, UNESCO.

In the science field, several already established international professional organizations became involved in the new UNESCO:- the Intergovernmental Oceanographic Commission IOC; the International Geological Congress organized a subsidiary body known as the International Geological Correlation Programme IGCP; and various groups concerned with fresh waters came together to create a programme to be known as the International Hydrological Decade IHD. Thus, there was a structure on which to bring science knowledge to UNESCO to deal with the oceans, the solid earth, and the fresh waters; but there was, at the time, no widely recognized body to bring together and represent the rapidly expanding knowledge and concerns in the biological, human, and cultural sciences, although the non-governmental professional society, the International Council for Scientific Unions, ICSU, had established a programme of advanced research in several countries, known as the International Biological Programme, IBP. And there was no already recognised existing international structure to address various cultures throughout the world and how they related to natural resources.

To consider the need for and possibilities of including the biological and human sciences in UNESCO, a remarkable conference was held in Paris in September 1968, to consider "the scientific basis for the rational use and conservation of the resources of the biosphere". This conference, which became known as **The Biosphere Conference**, was organized by UNESCO, with participation by the UN Food and Agriculture Organization FAO, the World Health Organization WHO, the World Meteorological Organization WMO, the International Union for the Conservation of Nature IUCN, and the IBP of ICSU.

This conference was the occasion through which the word “biosphere” and the concept it encompassed made its entry into international life and into many languages.

The result of this conference was the establishment within UNESCO of the Man and the Biosphere Programme, MAB. It should be noted, in retrospect, that MAB is the collective creature of cooperation between a wide range of different international bodies, that it was envisaged to be a scientific body, and that “rational use of the resources” (which today we might call sustainability) and conservation were its purpose.

MAB, at the Beginning and through the Decades

The formal objective of MAB, as developed at the Biosphere Conference and approved by the United Nations General Assembly in 1970, is

“to develop within the natural and social sciences a basis for the rational use and conservation of the resources of the Biosphere and for the improvement of the relationship between Man and the Environment; and to predict the consequences of today’s actions on tomorrow’s world and thereby to increase Man’s ability to manage efficiently the natural resources of the Biosphere”.

In those days, of course, “Man” was taken to refer to all of humankind, without gender connotations; “environment” had a generally narrower meaning than it has since acquired; and “resources” was commonly used in a broader sense than it often is today. But this initial objective and intent for MAB warrants careful thinking, and appraisal as to whether we are meeting those objectives, today.

Initially, MAB drew up a list of fourteen subject themes under which to develop its activities. Some of these were obvious topics of concern and where research and monitoring was already in progress and the activities could be usefully focused on internationally under MAB:- deserts, tropical forests, mountain ecosystems, for example. Other themes were deliberate and at the time daring attempts to bring new developments in science and knowledge “down to earth” such as Theme 8: “conservation of natural areas and the genetic material they contain”. And some were attempts to use the breadth of UNESCO to bring together issues that persisted in being seen as local, even though the problems were world-wide, as in Theme 11 concerned with urban areas and energy

utilization.

The MAB idea, getting well started, received a conceptual and political boost through the U.N. Conference on the Human Environment, held in Stockholm in 1972, at which political leaders from more than forty nations expressed together, for the first time, the importance of the natural environment in providing natural resources and the well-being of their citizens. The conference was chaired by a Canadian, Maurice Strong; and as one of those privileged to be on the preparatory team (as it happened responsible mainly for minerals, energy, and fresh waters), I was one of those who was able to build on the ideas of the newly-created MAB. The United Nations Environmental Programme, UNEP, came into being. The many resolutions from this Conference, and the provocative perspective book "Only One Earth" drew attention to the essential role that UNESCO science programmes, in particular the International Hydrological Decade and the Man and the Biosphere Programme, will play in maintaining peace, prosperity, and a good life for all of humankind.

Despite their policy approval, and widespread acknowledgement of their importance, MAB activities struggled. Governments in democratic countries found it very difficult to support MAB, for their funding and decision-making structures were organized along narrow lines of responsibility with specifically-defined issues and identified or predictable short-term results, whereas MAB was comprehensive, interdisciplinary, concerned with well-being as well as with concrete results; and was indefinitely long-term in viewpoint as well as addressing urgent crises. At the same time, governments or leaders of non-democratic countries felt bound to interpret "rational use of resources" in a self-serving, short-term fashion. MAB simply did not fit the political decision-making systems. The course of science itself raced ahead in a multitude of specialized and very expensive ways, and soon left MAB, with its modest budget, behind.

Thus, MAB, and the other UNESCO science programmes, IOC, IGCP, IHD which became the International Hydrological Program IHP, (and a more recently added one, MOST, Management of Social Transformations), became, not major practitioners or leading actors in international science themselves, but users of some advances of scientific knowledge (wherever it came from) in addressing societal and sustainability problems. The accelerating growth of interlinked environmental, economic, cultural and societal issues has made this coordinating and assessing role, rather than one of being front-line researchers themselves,

vitaly important.

In the mid-seventies it became apparent that it would be useful to identify specific sites where the concepts of rational use of resources, conservation, research, and education and training, all together, could be focused, tested, and demonstrated, and to serve as models to spread the ideas of MAB to a much larger area. The concept of **MAB Biosphere Reserves** developed. Initially, under Theme 8, Biosphere Reserves were selected as places where knowledge of a “core” area that would not be strongly affected by human activities over the years could be compared to effects, on the same ecosystems, of human economic and social activities carried out in the “normal” manner in that region (the “transition” area), with in between a space suitable for study to examine the processes of ecosystem change and sustainability-oriented human behaviour (the “buffer” area). This concept has over the succeeding forty years evolved and been applied in different ways, into the complex of Biosphere Reserves that we are discussing at this meeting. Although many of the other activities of MAB have continued, particularly in Africa and Asia, in some ways and in some countries the Biosphere Reserves have become the dominant features of MAB today.

The fundamental world-wide scope of UNESCO has led to a need to bundle at least parts of the activities and interests into packages that address similar needs and capabilities, for greater efficiency and economy. The United Nations itself, in the interests of effectiveness of its programs and the management of its budget, recognized five main geographic divisions of the inhabited world:- Africa; the Arab world; Latin America; Southeast Asia and Australasia; and then Europe, USSR (Russia) ,Canada and USA. In order to “bundle” its activities effectively, MAB has done the same. It has been natural and convenient to develop communication, a sense of sharing and belonging, and some joint or overlapping programmes into packages that have become AfricaMAB (south of the Sahara), ArabMAB, etc., and so on, to make informal networks that can, on occasion, carry out linked formal activities. The last of these groupings to be recognized was that including Europe, USSR, USA and Canada. Each component in this group already had its own distinctive MAB program and policies; and many of their leaders did not see any advantage in forming ‘yet another sub-organization’. But the countries in this left-over group had one distinctive thing in common:- they (together with Japan) were the donor countries that provided funds and scientific expertise to the MAB activities in the other groupings. There would be

advantages if these countries could get together on their use of and promotion worldwide of, MAB. And so, after a lot of meetings and some trials, EuroMAB came about.

The first EuroMAB meeting in 1991, in Berchtesgaden, Germany, showed quite quickly the benefits, to each of our struggling programs and aspirations, of coming together; and also demonstrated that by acting in concert, we could increase the effectiveness of the MAB-type activities which our separate countries were supporting in the less-developed areas of the world. The symbolism was not lost on those of us who were privileged to attend this meeting that there we, from many countries, were gathered collectively to set in motion peaceful development and cooperation, at the same location that had been the private retreat of a dictator who more than any other individual in recent history had done just the opposite.

Changes since the establishment of EuroMAB

What has happened since the first meeting of EuroMAB in 1991? We all know how the world has changed:-

- we tend to think of the political changes, both within the EuroMAB “bundle” and particularly outside of it, and we should stop to think how these changes affect the goals and activities of MAB;
- we are aware that the population of humans on the planet has increased nearly threefold in forty years, mostly in areas outside EuroMAB, with all that means;
- the world economy has more than doubled, mostly within the EuroMAB area.

And we also know, sometimes to our distress, that the surface of the planet itself has changed, in part because of human activities:-

- the hydrological characteristics (rivers, lakes, groundwaters, runoff basins, sedimentation, glaciers) of every continent except Antarctica and of most inhabited islands, have changed at a rate far in excess of the rate in previous centuries;
- the basic biological productivity of lands and (as far as we can tell, of the oceans) has decreased by perhaps ten per cent;

- all large terrestrial animals and plants are greatly reduced in abundance or disappearing except where under human management or protection, and the same appears to be happening in the marine realm;
- the human animal, now by far the largest mammalian biomass on the planet. is grouping more and more into concentrated conurbations (mega-cities), drawing sustenance from very large areas or from the planet as a whole;
- and the climate of the planet is changing, with effects on the patterns of temperature, precipitation, and insolation, and consequent effects on all terrestrial and oceanic natural processes.

But also we are aware that human knowledge and human capacity, individually or collectively, has changed greatly:-

- changes in technology are most obvious (there were no computers, not even xerox in Berchtesgaden 1991);
- dramatic changes in the quantity, scope, and world-wide accessibility and exchange of information, of facts, of opinions and expressions of observations and human thoughts;
- but perhaps most important have been the changes in the purposes and the use of knowledge.

Where do EuroMAB, and Biosphere Reserves fit in the scheme of things today?

To consider this question, it is useful to consider the **Philosopher's Staircase of Knowing** (Fig. 1).

The bottom step of the staircase of "knowing" is obviously **observation** of the world around us, or of phenomena that are of interest — and in the science field, **measurement**. of what we perceive.

But simple observations and measurements, by themselves, can mean very little, no matter how carefully they are made. They must be related to something, shown to be repeatable or *verified*,, in order to rise to the second step, and become **data**..

But data by themselves, are of no value; they must be arranged around some purpose or action, *selected*, or *tested*, before they can build the third step, **information**.

Information, disembodied and on its own, is of very little use. How many times have you heard it said the “if only we had more information, we would make better decisions”? Society today has inconceivably more information than any group of people in the past; but does that mean that we make better decisions?

Information must be *organized*, *interpreted*, and applied to a specific set of questions before it can become **knowledge**: -the fourth step..

Knowledge, when assembled to relate to many sides of a question through *comprehension* and *integration*, can lead to the next higher step, **understanding**.

And understanding,, when applied broadly and used with *judgement*, can lead to **wisdom**.

Think about this logical staircase. Note that each step along the staircase leads to increasing subjectivity, and that each “riser” between steps means increasing human value added to the original objective observations or measurements. Thus it is very hard to reach understanding or wisdom by concentrating only on quantitative data or information. Also, it is apparent that the staircase has a railing on which one can slide quickly to the bottom if any step is found to be faulty, or if the observations or the information are found to be unsound.

Where does science fit onto this staircase? Clearly, on the bottom three steps. To go higher, one must have a good scientific base, but must rise above the information, beyond science, to achieve knowledge, understanding, and, one hopes, wisdom.

Where do Biosphere Reserves fit? Clearly, they belong all the way up, and then up-and-down-and-up-again to serve their full potential. And this is the job of EuroMAB- to bring all relevant aspects of science, observation, data, and information into the issues of Biosphere Reserves, to guide them through acquiring knowledge and understanding (and hopefully, wisdom), and to provide examples of how the Biosphere Reserve staircase is of real benefit to society and the planet.

The total volume of available information is increasing all the time. We should ask ourselves:- has our understanding of the issues important to humankind and the ecosystems increased at the same rate? I suspect that it is the “risers” or step-ups of the staircase, not only the steps of information and knowledge on which we can stand,, that need attention.

This Meeting

At this EuroMAB meeting, we are focusing on “engaging communities”. under different topics, and using different tools.

We have learned about, and commented on,, several good examples of Biosphere Reserves being the location of , or the agent of, getting people and their institutions to look beyond their immediate problems and to place value, collectively, on a broader, longer-term result. This brings us from knowledge into real understanding. Can we hang on to it? Think again of the examples given in the last two days, of multi-actor communication, of the reports of genuine attempts to bring the habitual concepts of the marketplace to the management of “Nature”, and the examples of dealing with different politics and cultures in trans-boundary Biospheres. All of these are good examples of “works in progress”. We are learning from one another All this is very good: it is what EuroMAB is for.

Despite these positive elements, this observer could not help being aware of a general feeling expressed in this meeting that MAB and Biosphere Reserves are not understood, appreciated, or used to full potential by the public, nor by governments, or by business.

Why?

There are of course many reasons, all intertwined; but perhaps most important is that almost all our education, political, and business decisions, in all EuroMAB countries, are based on a deeply built-in habit and training of separate decisions limited intentionally to different narrow subjects and categories of responsibilities. In most issues relating society to natural processes and resources, there is no dominant area or single actor of concern or of damage incurred, and no main beneficiary of positive activities. Because Nature is integrated, ecologically, spatially, and chronologically,, and because MAB is deliberately an integration, which takes all factors into consideration and is

flexible to absorb new problems or promote new solutions, our disintegrated narrow-purpose public attention and attempts at understanding, our interest-specific government structures, and our profit/loss economic systems cannot deal with the issues of MAB, except in small pieces, even though the individual practitioners may agree philosophically with its integrated concepts .

What to do? We cannot disintegrate Nature, especially now that we are learning much more about how she works. But it is wise to remind ourselves that the ancient Greeks, who devised the mental concepts of government and democracy that we have used ever since, explained the whole universe in terms of four elements: **Earth, Air, Fire, and Water**; and that the Christian religion, as interpreted by the Holy Bible in 1611, reduced all the multitudinous problems of human behaviour to only **Ten Commandments**. Perhaps MAB should think about this.

Biosphere Reserves, and EuroMAB as an organization, are essentially integrators.. That is their strength and purpose. But it also a weakness that makes it very hard to connect with, or get substantial support from, the single-issue mental concepts and decision-making systems that are pervasive today.

The **Seville Strategy** and **Statutory Framework** of 1995, followed by the **Madrid Action Plan** of 2000 have given us a good road map along which to move our continually changing and evolving Biosphere Reserves. In many EuroMAB countries they helped MAB re-align and re-focus on the three essential and inter-related concerns that are fundamental to Biosphere Reserves: the conservation concern, to give evidence of maintenance of ecological sustainability; the logistic concern, to facilitate scientific research, monitoring, and communication; and the development concern, embodying local participation, economic activities and use of natural resources. This Strategy, Framework, and Plan have provided a basis for EuroMAB, as the overall overseer and communicator if not the driver, to keep Biosphere Reserves both relevant to evolving major socio/economic and environmental/ecological issues and to be examples of a more positive way ahead. How well have Biosphere Reserves progressed in this regard, and how well has EuroMAB fulfilled these duties?

Communities

The theme for this workshop is “Engaging our Communities”. In looking through the agenda, and attending various workshops, one cannot help but note

how widely and varied is the idea of “community” as addressed. Most people at first use the term in the sense of an identified collection of people and the place where they live that, together, have some physical characteristics, interests and behaviours in common somewhat distinct from the surrounding places or interests. For many people,, a small or medium-sized settlement and its inhabitants is a community. Thus, Brockville, where we are meeting today, can be a community; and so can many of the smaller towns within the Frontenac Arch Biosphere Reserve which we will visit. But a community need not be a geographical concept:- we speak of “the science community” or “the music community” to identify collections of people with similar interests and abilities. Certainly, we all are aware that the Internet and changes in transportation technology, together with changes in education, have played havoc with earlier simple concepts of community.

How big and diverse can a community be? Is the city of Beijing a “community”? Professor Bonnes and MAB-Italy have made a good case that the entire city of Rome is a community, and justifies being a Biosphere Reserve in its entirety. How physically cohesive need a community be? Many of the arguments in favour of Cluster Biosphere Reserves and Trans-Boundary Biosphere Reserves make the point that people in similar natural environments but geographically separated constitute a community,

Does a community include only *homo sapiens*? No one would dispute that a hive of bees is a community on its own, by any definition. But what about the grizzly bears in Waterton Biosphere Reserve, the subject of a paper at this conference describing the progress in positive interaction between bears and people? I, like Parks Canada, would include grizzly bears as a legitimate part of the Waterton community. But are we prepared to go as far as the City of Mombetsu in Hokkaido, where the city manager proudly told us that the black bears in their mountains are full Japanese citizens, and thus there are no questions about hunting rules, etc., because bears each have full citizen’s rights (and presumably, some responsibilities)? You don’t shoot the fellow citizens of your community.

“Engaging Our Communities” must be a two-way process. I hope that our Workshop Reports will show that the communities, however we define them and however we are engaged with them, give back to EuroMAB and to the Biosphere Reserve in equal measure to the ideas and support we try to bring to them.

Where are we, a half-century after UNESCO, forty years after MAB, and a couple of decades after EuroMAB?

Here are some crude personal opinions:

On the plus side: The United Nations, and UNESCO, now have a well-established organization for addressing biological issues and their relationship to human issues, activities, and threats. How well it succeeds or fails in doing this is, in part, why we are here today; but the organizational framework is there.

On the not-so-good side: One could make a long list; but principal among the shortcomings might be:

(i) Biosphere Reserves and EuroMAB have to a considerable extent lost their essential connection with non-biological sciences, with the advances in the biological sciences, and have taken little part in recent research in the social sciences;

(ii) MAB and Biosphere Reserves have become to a large extent introspective, and are not involved in leading knowledge-based activities, internationally or with some exceptions nationally or locally; they are users of new knowledge or passive recipients having to cope with an onslaught of continually changing issues and new technologies and threats;

(iii) MAB has lost its natural linkage with the other science programs of UNESCO and to a large extent with its major education programs; and Biosphere Reserves rarely serve as sites for these other UNESCO activities, even though they are eminently suited for them;

(iv) most of the world today, outside the UNESCO/MAB family, is unaware of EuroMAB or Biosphere Reserves, even though the public, their governments and businesses are embroiled in and very concerned about, the very issues to which EuroMAB and Biosphere Reserves can make a positive contribution.

Thus, to some extent, Biosphere Reserves and EuroMAB have helped the United Nations and the world meet the Education, Science, and Culture responsibilities of UNESCO, but in the rapidly changing situations and problems of today, we are far short of meeting some of the simplistic ideals for which with good reason, they were established.

I think that we have seen, at this meeting, that MAB must be realistic, but at the same time idealistic, EuroMAB, as an association of representatives of most of the industrially-developed nations of the world, has a responsibility, and some collective capacity to put some of the current and forthcoming major problems of society, natural resources, and environmental change into context, and to contribute toward dealing with them. And Biosphere Reserves can be major tools for working on these problems through Education, Science, and a variety of Cultures, and can be examples and demonstrations of a more sustainable future. But it is a very heavy agenda, and there is lots of work ahead.

Some Hard Problems, and some Suggestions

At the beginning of this meeting, we were thrown some challenges and hard questions:

— are Biosphere Reserves a positive demonstration of “the way we want the world to go”, or are they mainly defensive backwaters, trying to preserve some of the benefits and values of a natural world and love of Nature that is fast disappearing?

— are we succeeding in using our World Network of Biosphere Reserves to change world consciousness about our dependence on natural resources and the favourable conditions of the environment?

— are we, in EuroMAB and in our Biosphere Reserves, organizing ourselves to meet the social, physical, and ecological consequences of climate change, decrease of easily available fresh water, destruction of forests and productive soils, and increasing energy costs? Are we able to examine, in a knowledgeable way, and through MAB deal with, some of the “tipping points” that are approaching?

— are we ready to take further steps, through EuroMAB and Biosphere Reserves, to continue to work hard to reduce the progressive destruction of the biosystem, and to help significant numbers of societies and cultures play a positive role in the total natural/societal ecosystem?

These are very, very hard questions to answer. We should take them home with us.

What to do, in a practical way? I am fully aware that our options and capabilities are limited. Our National Commissions for UNESCO are mostly under-funded and over-worked, and in many cases cannot call upon the expertise that is needed. Of course I am aware that EuroMAB is a voluntary association whose representatives, often with great experience and ability and strong convictions about the ultimate benefits to the planet and to humankind of what we are trying to accomplish, are nevertheless persons with other commitments and occupations and limited ability to call upon major political or financial support. And I know that almost all Biosphere Reserve managers and personnel depend upon their passion rather than on employment in their position, are largely volunteers, and are more than fully occupied in keeping their Biosphere Reserve alive, with no real time or opportunity to take on more duties or interests.

Nevertheless, I might from my perspective make some suggestions that could urge the present UNESCO/MAB/Biosphere Reserve structure to look around a bit, to take advantage of other developments that may be useful to them or to which they might contribute, and so achieve some of their larger goals more effectively and perhaps increase the resources available to them. Here are some suggestions:

(i)- both the National MAB Committees of the EuroMAB countries, and the National UNESCO Commissions where relevant, should re-establish connection with the other UNESCO science programmes IOC, IGCP, IHP, and MOST, and become informed about what of their activities are relevant to MAB. I am aware that in some countries, some of these branches of UNESCO are inactive. But in some other countries, some of the programmes are very much alive, and have dynamic activities related to climate change, urbanization, coastal and river basin management, etc., which are or could be very relevant to MAB interests; and there could be real benefit, and perhaps some advantages or opportunities in funding and sharing of expertise, by cooperation and collaboration. Biosphere Reserve sites, research and monitoring, etc., could bring real value to some of the other programmes.

(ii)-National Committees and Biosphere Reserves should make contact with, and seek areas of cooperation or interaction with, other international activities in relative subject areas. An obvious one, it seems to me strangely neglected in recent years, is with the International Union for Conservation of Nature, IUCN. It will be recalled that IUCN was one of the founders of MAB in 1968. Since then it has changed considerably, to be very relevant and still more influential in

copied with changes in the natural world and human influences on it; and closer interaction with MAB and Biosphere Reserves would seem to be over-due. Another activity under the International Council for Science (the former ICSU) could be, for example, the International Commission on Large Dams, which deals with topics very much in the current news in some countries because of the priorities for renewable energy development but with all the issues of displacement of traditional cultures and habitations, re-arrangement of river basins, and affecting some Biosphere Reserves. Some of this was brought up at this meeting.

(iii)- EuroMAB, and Biosphere Reserves, it seems to me, if they are going to prosper need to pay much more attention to developments based in the private and commercial sector that have similar or like-minded objectives. An outstanding example and opportunity is the International Association for Impact Assessment, IAIA. This world-wide independent organization, now in its 33rd year, with members in more than 100 countries, is dedicated to assessing and communicating the impact that commercial and social development activities have on the environment, on societies, cultures, and on the economy. As such it has many elements that are very much in line with MAB, and at least in some parts of the world, it makes full use of Biosphere Reserves as reference sites. IAIA has ten sections, dealing respectively with Biodiversity and Ecology, Corporate Social Responsibility, Climate Change, Cultural Heritage, Indigenous Peoples, Health, Public Participation, Social Impact Assessment, Strategic Environmental Assessment, and Agriculture, Forestry, and Fisheries. Because of the scope and momentum of IAIA (the 2013 international meeting had more than two thousand delegates and six hundred presented papers), and because almost all of its subjects are of interest to MAB, it seems obvious that MAB should keep up-to-date with it.

(iv)- Another area where it seems to me that MAB and Biosphere Reserves in recent years are less active than it would be good to be is with regard to the education systems in member countries. After all, the "E" in UNESCO stands for Education. I am fully aware that UNESCO has undertaken some very valuable international education programmes, such as Education for Sustainable Development ESD, and also appreciate that in many EuroMAB countries formal education, as such, is the responsibility of the secondary level of government whereas MAB members are connected to the primary level. But on the ground, at the grass roots where Biosphere Reserves operate, there is in most countries

ample opportunity for interaction with the local school systems. More use could be made of the "UNESCO Schools" where they exist; and perhaps EuroMAB could be an influence to establish more of them. Many Biosphere Reserves, in several EuroMAB countries, have developed excellent activities involving school children and school classes:- these not only serve to promote the goals of MAB, but they develop in the future citizens a knowledge and awareness of the environment, and of natural resources and responsibility to protect them. Perhaps much more use could be made, by EuroMAB and by Biosphere Reserves, of the opportunity to exchange information from these individual activities, to learn from each other, and to strengthen this aspect of Biosphere Reserves.

(v) -One shortcoming of most Biosphere Reserves in the EuroMAB area is the distressing paucity of technical or scholarly information or references emanating from the Biosphere Reserves individually or from MAB itself, concerning the researches and monitoring and application of knowledge that is one of the major expected goals or benefits from the whole concept. There is a heavy volume of administrative reports, annual reports to sponsors or assessors, etc., but as far as I am aware there has been little, in the science field, to show what has actually been learned from the studies or monitoring, or assessments of what the science in the Biosphere Reserve is leading us to speculate about the changes in the future. Yet this aspect of MAB and Biosphere is central to the reasons for their existence: note the 1970 objective of MAB quoted above. Each candidate Biosphere Reserve, in its application to UNESCO, includes a comprehensive list of scientific researches and monitoring activities carried out in the area up until the time of the application, and statements of planned future research, as part of the justification for being admitted to the World Network. Surely it is logical and indeed an obligation, for established Biosphere Reserves to collate, record, and make accessible information about the on-going researches and monitoring within or related to their area; yet for most Biosphere Reserves this does not seem to happen.

I am fully aware of the slim budgets of Biosphere Reserves, that the managers often do not have time or capacity or resources to compile technical reports, and that most of the important scientific work is undertaken by persons who prefer or are obliged to publish in the peer-reviewed scientific literature in the relevant disciplines. Nevertheless, one of the failures of MAB and Biosphere Reserves is that, although they are the embodiment of UNESCO in the biological and human sciences, they are not themselves major sources of scientific information in the

subject fields where they are active. Regularly issued annotated bibliographies or summaries of scientific work in each Biosphere Reserve or national MAB activities would go a long way to meet this obligation, and benefit both the Biosphere Reserves and MAB on the one hand and the scientific world on the other. There have been exceptions:- the Canadian Mt. Saint-Hilaire Biosphere Reserve in the 1980's published annotated bibliographies of the scientific researches carried out within its borders (a list of more than two hundred scientific papers, even at that time), and the Vosges du Nord Biosphere Reserve in France published a review of its researches in a major scientific journal. But on the whole, MAB and Biosphere Reserves have done themselves a disservice by not making their own scientific work available in their own name. Perhaps it is time, and opportunity, for the Biosphere Reserves to be seen, publicly in the scientific community, to be centres or collators of scientific knowledge about their area, even if the researches and original results are published elsewhere.

Perhaps EuroMAB should look into.

How to feel, going home?

There is no doubt that Biosphere Reserves are a worthwhile and important, indeed much needed, network of endeavours in the world today. And EuroMab has more than "earned its keep". But both could do much more, even with the resources presently at hand.

On a larger scale, regionally and locally,

-if we keep our sights fairly low, and confine our concerns and interests to the immediate situations with which we are presently dealing, we can feel quite good. MAB, and the Biosphere Reserve concept, is a positive influence on the planet and on human society.

- but if we raise our sights to the current condition and prospects for the planet and its biosphere, to the current numbers and actions of the human species and trajectories of its future behaviour and consequent effects, it will be hard to be realistic and remain optimistic. We should keep those tough questions in mind. But their seriousness should not deter us from trying our utmost to make things better.

Thanks.