

HOW TO PROMOTE REMOTE SENSING - THE ASIAN EXPERIENCE

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ABSTRACT:

Over the past decade there has been a substantial increase in research applications of remote sensing in the Asian region, stimulated in part by the establishment of the Asian Association on Remote Sensing in 1980 and the Association's annual conferences. A regular plenary session at these conferences has been on "How to Promote Remote Sensing in Developing Countries" contributed to by delegates of the member countries and international delegates. This paper summarizes the major themes resulting from these sessions to assist other regions in developing a similar growth in remote sensing expertise.

KEYWORDS: Promote, Remote Sensing, Asia.

1. INTRODUCTION

The Asian Association on Remote Sensing was formed in 1980 to overcome what was seen as a lack of opportunities for Asian scientists to cooperate and present the results of their work. Since then an annual conference has been conducted in various countries of Asia, which has been a major stimulant to the growth of an understanding and the application of remote sensing in the Asian region. Over the past twelve years virtually every Asian country, including countries of Australasia, have joined the Association, while a number of non-regional countries have joined as associate members. Over this period there has also been a substantial growth in remote sensing staff and facilities. For example there are now over twenty national programs and centres, and numerous sub-centres, and over 10,000 scientists and application specialists in various sectors. During this period three countries, India, China and Japan have launched remote sensing satellites, and ten ground receiving stations have been established.

In recent years as part of the Association's annual conference, a plenary session on "How to Promote Remote Sensing in Developing Countries" has been conducted. This has been contributed to by senior scientists and application specialists from countries of the region and other regions. The paper summarizes the discussions of these meetings, firstly with regard to the problems that need to be overcome and secondly with regard to positive measures to promote remote sensing.

2. PROBLEMS

Many of the problems discussed by speakers at the sessions covered a commonality of areas. In general these were related to:

- * environmental issues
- * educational issues

- * financial issues and
- * promotional issues.

Within the Asian region there are an estimated 200 million people who are undernourished. Because of the magnitude of this problem many short-term solutions have been implemented that in the long term have been seen to be ecologically incorrect. Many of the environmental problems such as floods, desertification, climate change cross national borders, have not been effectively addressed due to lack of inter-country cooperation. It has also been common for solutions developed in other regions to be applied in the Asian region, with at times, disastrous results.

For the transfer of remote sensing technology to be effective, education and training are required at a number of levels. While a range of training programs have been offered in the Asian region, they have not produced staff operating across the full spectrum of activities ranging from research to technical support, which has led to a lack of indigenous capabilities in direct and supportive roles in the use of remote sensing. To some extent the middle level application roles have been addressed, but the areas of technician and technical support and, at the other extreme, the level of research scientist, have not been addressed. Often the important area of field support and field data acquisition cause projects to be delayed or to provide only limited data, in addition many manufacturers have provided equipment, particularly image analysis equipment, without adequately training support staff. Long delays are often experienced when systems malfunction.

With the limited number of research scientist being trained an insufficient nucleus of scientists exists to further develop remote sensing technology to support the needs of a particular country. Once external support is removed the technology stagnates and is not renewed by indigenous research. While application scientists have been relatively well catered for in the region, even here the training has not always addressed the application problems of the region, but has transferred solutions more appropriate to problems in Europe or North America.

In many cases while data and staff are available the use of remote sensing has been hindered by institutional problems. These can relate to institutional arrangements, institutional procedures and infrastructure that are not appropriate to the application of the new technology. Many bureaucrats are suspicious of remote sensing technology due to its oversell during the 1970's, and in addition their concept of data needs and data collection methods for their departments were developed in a pre-remote sensing, and there is little stimulus to change these attitudes, or indeed little opportunity to do so. In many cases the institutional arrangements are

insufficient to allow rapid purchase and access to data on an opportunity basis, when the data is available in a time frame substantially less than the procedural time frame. Further the multi - disciplinary nature of remote sensing often requires cooperation across departmental boundaries, but the rigidity of the institutional structures does not easily allow for this to occur.

Many of the institutional problems are exacerbated by financial considerations. In developing countries, especially in the least developed countries, fundings for operations has become very difficult due to the debt crisis of the 1980's. The high cost of satellite remote sensing data and the technology to support it, is a major limitation to its use, and often also creates long delays in its acquisition while bureaucrats determine the appropriateness of the expenditure. Unfortunately the greatest need for resource monitoring is often found in the poorer countries that are least able to afford the technology. In most countries of the region either the data or the support technology cannot be acquired without funding by external aid. Some of the problems relating to financial consideration, however, also stem from a lack of cost - benefit studies to support arguments for the use of remote sensing. While scientists and application specialists can point to examples of the use of remote sensing in other countries, there is little data available to mount arguments sufficiently convincing to sway policy and decision makers to release limited funds. This is not assisted by the general lack of knowledge of the technology by these people. A further financial problem relates to the external suppliers of funds and equipment. Often they have a fixed concept as to how these resources should be used, which does not always match the immediate or long term needs of the country. In many cases projects with overlapping goals are supported from external sources, as departments vie for funds and status, with little knowledge that this is occurring, leading to a wasteful use of the resources. This problem is exacerbated when a coordinated national program is not in place.

Some common situations that have arisen are as follows:

- a country may have a receiving facility, but lack of user awareness results in low usage of the available image and digital products
- major image analysis computing facilities may be funded without adequate training support
- international agencies may fund similar resource related projects through different government departments, that have considerable overlap with regard to remote sensing training and facilities, yet little collaboration occurs
- higher level research and professional training may occur without adequate training for paraprofessionals, technicians or users in the field
- high technology solutions may be applied to uses that can be more efficiently and economically solved using low cost visual interpretation of hard copy images

Problems related to the promotion of remote sensing, or lack of it, were seen as a major concern by many of the country representatives. In the early 1980's the limited awareness of the benefits of remote sensing at all levels of government and the community, was seen as a major inhibitor to the optimal transfer of remote sensing technology. Senior government staff felt threatened by a technology they did not understand, the community, from where the potential applications should derive, were unaware of the technology, government departments continued with methods with which they felt comfortable without knowing the benefits of remote sensing, academics continued to teach and research outdated technology, and the private sector, in many cases quite small, were unaware of the technology, and failed to stimulate its use.

3. SOLUTIONS AND PROMOTION

The annual conference of the Asian Association has been a major stimulus to the promotion of remote sensing in the Asian region. It has provided a focal point for the dissemination of indigenous research, and acted as a vehicle for the development of greater cooperative ties between scientists and users of the region, and as a point of interface with the international scientific community. Better cooperation has seen projects initiated that cross country borders, and also link to global studies. By providing a holistic non - sectoral view of the region remote sensing has led to a better balance between preservation and exploitation of resources, within the socio - economic and cultural environments of the peoples of the region.

An attempt is now being made within the Asian region to view remote sensing training and education in a total sense, from the required large technician base to the small apex of research scientists. The critical mass of technicians, application specialists and researchers, essential to the use of remote sensing, is gradually being reached. Awareness programs, developed specifically for decision makers are increasingly being provided by in - country specialists, which is contributing to a greater understanding of the technology, and more rapid approval of projects. Often these are being provided by local private sector groups. Most projects funded by overseas aid organisations also contain a substantial, balanced, educational component, as national coordinating bodies and aid agencies more critically vet the overall project needs.

The importance of national inventories, of training and education facilities, of trained staff, of equipment, of current and proposed projects etc, was seen as a major solution to the problems of remote sensing technology transfer, and the recognition of those transfer elements that need priority funding. Such studies have been proposed by the Asian Development Bank, and have been undertaken in a number of regional countries, for example in Malaysia as a basis for the establishment of their National Remote Sensing Centre. It was stressed that each country must assess its funding requirements and determine the merits of each funding opportunity in the light of these national inventories, and that great care should be taken with funding proposals that imposed specific equipment and methodologies, as in the long term these could lead to costly maintenance, restriction of opportunities and inappropriate technology transfer. As much of the technology is generated external to the country, it was seen as important that good communications with these sources be established, to allow full understanding of the technology being acquired. Given the advantages of radar remote sensing in cloud covered tropical regions and the growth of integrated remote sensing and GIS projects, it is considered that a good understanding of these new technologies is important. Regional countries such as India, China, Australia and Japan, have to some extent overcome the reliance on external technology sources, by developing indigenous technology, ranging from satellites and sensors to image analysis systems and software.

As discussed under problems, it was seen as critical to the development of indigenous capabilities in remote sensing, that countries of the region have access to spaceborne remotely sensed data. Ideally this can be achieved through the establishment of national receiving facilities and an appropriate data distribution mechanism. Although it was recognised that such a facility may not be possible for all countries due to lack of internal or external funding. The Asian region is generally well served by receiving facilities which have been installed in a number of countries over the past

decade, acquiring data from satellites launched by both regional and non - regional countries. However it is still found in many cases that it is not the lack of these facilities that is impeding the application of remote sensing, but the high recurrent cost of image purchase. In these circumstances, it is suggested, that urgent international consideration be given to the provision of data at as low cost of possible. Provision of data could well be considered as a continuing form of aid from the developed countries. It is further suggested that within countries, remote sensing data should be distributed and available at little or no cost recovery, being treated by government in the same manner as support for infrastructure. As yet these policies have not been implemented throughout the Asian region.

It is considered that institutional issues cannot be adequately assessed until the formal and informal networks operating in a country are fully understood and strengthened. This seen to be best addressed by the establishment of national coordinating committees to facilitate and coordinate the introduction of remote sensing technology. The membership of these committees should consist of representatives of user agencies or potential users agencies, including the public, private and education sectors. In addition it is considered that these persons should include both users and policy makers, who control the source of funds. The major role of these national committees should be to facilitate the promotion of a nationally integrated policy supported by a master plan for the phased introduction of remote sensing technology. National committees have been established in most of the countries of the Asian region, however the level of commitment of governments to them and the advice they provide, is somewhat varied, and thus their positive influence has not been fully exploited.

It is considered that part of the role of a national committee is to develop an awareness of the benefits of remote sensing at all levels of government and the community. In the Asian region such awareness has been developed through education and training programs, public relations and the demonstration of current remote sensing technology and products. Activities that have been suggested or implemented in the region include:

- the production and distribution of national or regional newsletters or journals. (Prime examples of these are the UNDP ESCAP publication, and the book, "Applications of Remote Sensing in Asia and Oceania" published by the Asian Association on Remote Sensing)
- the development and utilization of contacts with media representatives
- technical and regional cooperation
- the development and presentation of awareness workshops for appropriate government, private, and educational decision makers
- the development of audio - visual and demonstration material for distribution to appropriate persons and agencies
- the establishment of comprehensive and appropriate educational programs, from secondary to graduate levels
- the establishment of joint research programs both in - country and internationally
- the establishment of a regional network of user groups

4. CONCLUSIONS

The Asian Association on Remote Sensing and the annual conference it supports has been a major stimulus to the growth and promotion of remote sensing in the region. The problems and solutions arising from the plenary sessions "How to Promote Remote Sensing in Developing Countries" conducted at these conferences, have been summarised, with a view to providing advice and support to other regions of the world.

REFERENCES

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