Mobile Interactive GIS: Bringing Indigenous Knowledge and Scientific Information Together. A narrative account

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Introduction

Over the past five years a handful of New Zealand academics and development workers[1] have developed a survey approach to small holder rural communities based on Participatory Learning and Action (PLA) which involves the use, in remote areas, of quite accessible computer graphics (Freehand, digital photographs, Photoshop) and GIS (Arcview). Information is processed, projected for viewing by the farmers, altered and discussed on screen or at least on the spot. We have found this Mobile Interactive Geographic Information System (MIGIS) to be an excellent way of engaging farmers interest. Full, if brief collaboration is *de rigueur*. The content of village reports is completed before the outsiders depart and the first copy goes to the participants. The process allows for open consultation, transparency, the articulation of challenges and problems and the rapid turn around of results means they can be shared with all stakeholders in a form which is both dignified enough for bureaucrats to take seriously and invariably pleases farmers.

It is our experience that illiterate farmers in relatively remote highland and lowland areas of Southeast Asia are quite capable of reading and drawing maps, understanding images like aerial photographs, can draw up their own criteria on the distribution of wealth, prepare trend lines, analyse institutional relationships and so forth and are very willing and able to discuss their situation in an informed and intelligent manner. As most anthropologists will tell you, acknowledging a shared understanding of the world we live in can be a very rewarding experience. Placing indigenous knowledge and scientific information in opposition to one another is an unnecessary division that does damage to both[2].

MIGIS falls into a field that is not without its critics. The type of technical efficiency described is not necessarily a recommendation. It does not sit easily with participatory, grassroots purists who, amongst other things, see it as an unnecessary intrusion which transforms homegrown studies into either information extraction exercises or seriously compromises the nature and local ownership of results. Censure is muted but persistent. Those who experiment are not encouraged to publish news items. Little wonder then even

[1] Victoria University of Wellington and the consulting group Kinsa Associates including Dr Graeme Aggett (now of Washington State) Dr Jack McConchie and Jean McKinnon.

[2] For most practical purposes setting up a dichotomy between indigenous and scientific knowledge is largely unnecessary. From the perspective of 25 years work with minority peoples in Southeast Asia the practice looms in my mind as a Post Colonial, Orientalist fantasy; an exercise in mystification that perpetuates essentialist views of ethnicity that are unhelpful and misleading. The concept allows us to admit the possibility of other learned ways of thinking and then confines this reality to a separate compartment reserved for the quaint and unusual. Communication is not the problem, inappropriate attitudes and behaviour are.

as late 1999 it was being reported that "the use of GIS in a truly participatory context is in its infancy" (*PLA Notes* 34, February 1999: 16).

This quiet aversion fades to insignificance in the face of what academics like Rundstrom have to say. For him the use of tools like GIS in the situations in which the MIGIS team has worked is "potentially toxic".

> *GIS technology, when applied cross-culturally, is essentially a tool for epistemological assimilation, and as such, is the newest link in a long chain of attempts by Western societies to subsume or destroy indigenous cultures* (Rundstrom, 1995: 45).

This is tough talk. Assimilation or separation are the only choices? What about occasional, transient, fragmented communication? Should we take him as seriously as he takes himself? It is difficult to do so. There is too much work around that does not fit Rundstrom's interpretation. For instance Nietschmann's work defending the Miskito reefs with maps and GPS (1995), Harmsworths work in New Zealand done with the full cooperation of his Maori partners (1999) and so the list could go on.

What is an appropriate response? How does MIGIS work fit into this critical picture? What has the Victoria University group learned?

In this paper I will review fieldwork undertaken in Thailand, China and Cambodia, outline what was done, how it was received by farmers and partners, and look at some of the limitations we have experienced.

Early Work

The work first arose out of a 1985 resurvey of Vella Lavella in the Western District of the Solomon Islands where I had conducted PhD fieldwork (1969-70). I was struck by the rapid increase in the number of people and pressures being brought to bear on local leaders to approve concessions that would allow Malaysian and Filipino companies to cut the forest. Village leaders under pressure from migrant settlers talked of wanting an opportunity to map the occupation of land, review the rules of customary tenure, and lineage rights. With the help of these leaders I wrote up a proposal for joint research in which communities would participate in carrying out an inventory of the forest, and work with information on land tenure and population increase to project future land needs and elaborate the demands this might place on sustainable use of the environment.

If there were several beleaguered leaders keen for work to be started there were also lineage leaders who had constructed quite remarkable individual claims over vast tracts of forest who were definitely less enthusiastic. (McKinnon, 1985 and 1993).

A team of three was put together. Portable laptop computers were not yet up to the task and it was planned to do most of the mapping with a PC powered off a generator using a mapping program written by the GIS specialist, and with the help of a particularly gifted cartographer, by getting people to sketch and post information on a series of bulletin boards in the middle of the village everybody would have a chance to participate. Maps, pictures and diagrams would be used in preference to the written word. Like all good participatory research it was designed not so much to rock the academic world but provide

results that would better enable the community to make up its mind about the future of their own forest and the activities and values associated with it.

From the very start the project challenged traditional leaders who did not want people to know too much. Funding for the research could only come with the approval of the provincial government in which the chiefs had some say. Consideration of the proposal was delayed again and again. Before a serious response came through the team had dispersed. Within three years of the 1985 survey the forest had gone.

The first lesson was not a surprise. The major difficulty was not the methodology. The big issue was whose understanding and whose voice was going to be empowered, and whose muted by the work. To rage against toxic technology seems misplaced. In an arena in which everybody was and remains indigenous and the outsiders were only offering to play the role of chauffeurs to take people to a destination of their own choosing is difficult to see the poison.

NORTH THAILAND – KAREN EXERCISE

By 1995 new technology made it possible to carry powerful laptops into the field, integrate scientific maps with sketch maps drawn to scale, generate images and symbols on diagrams and drawings from digital photos and scan drawings to use in place of the written word. In May 1996 a paper was presented at the 1996 Hani-Akha Conference entitled "Interactive GIS Enhanced PRA for Hani – Akha Community Planning: a proposal in search of a partner". In January 1997 a further presentation was made at the Advanced Seminar on Social Anthropology in China entitled "What can PRA and Mobile Interactive GIS Contribute to the Development of Applied Sociocultural Anthropology in Southwest China" [3] The challenge was to find local researchers interested in working with us. We set three rules of engagement.

- Do not undertake fieldwork without a local professional research partner.
- Do not enter a village without the express support of a counterpart who speaks the same language of the proposed study village
- Do not initiate work in the absence of an invitation from the community to work with them.

Through experience of research in the Highlands of North Thailand and the help of a few professional friends like Ajarn Chira Prangkio at CMU an agreement for the first field trial was negotiated with the Karen village Ban Huai Hoi just south of Chiang Mai. We were fortunate enough to also secure the support of Khun Prasert the director of IMPECT (Inter-Mountain Peoples Educational and Cultural Training Programme

Ban Huai Hoi was a community of approximately 40 households and 200 people who managed a small watershed of some 6300 rai (1000 h.) situated at about 800 metres above sea level. Most of the inhabitants are Christians about equally divided between Catholic and United Church Protestants. When the two *farang* researchers took up residence for a eight days in early June 1997 the farmers were waiting for the rains to come in. As they were unable to engage in any significant agricultural work they were readily available for

[3] A later version of the paper edited to include issues arising from discussions was subsequently published in 1998 under a different title see References

discussion. Fieldwork was monitored by IMPECT staff and Dr Sanay Yarnasarn and Ajarn Chira Prangkio of CMU.

Our arrival was scheduled to coincide with a day of remembrance for a villager who had been part of a Assembly of the Poor demonstration outside the National Assembly for 99 days and died on the journey back to Chiang Mai. It was convergence time. In a predominantly Christian village a Buddhist memorial was dedicated to his memory and those attending the service then walked to the top of the watershed where a pig was killed at a Karen shrine to honour the spirit of the land. The adjacent forest was placed under protection. After a feast and speeches attended by the Nai Amphoe a meeting of the various interest and pressure groups (i.e. Northern Farmers Network Organisation), made up predominantly of faculty from CMU was convened in the Protestant church. The MIGIS technical trial was run after the special guests departed.[4]

The equipment mounted in the trial included:

Laptop computer -	capable of running the GIS efficiently and effectively and quickly enough that the villagers would not become bored waiting for the images to display (Acer Light)
Roll-up digitiser -	for the villagers to draw on directly or serve as a base for converting both published maps, and locally produced sketch maps, to digital form (GTCO).
Digital camera -	for taking photos and other images of the villagers and local environment (Kodak) .
Video projector -	for displaying and projecting images onto a large screen so that all the villagers could review the output, and be involved in discussions (Epson EMP-5000).
GPS system-	for positioning the village, running transects, and measuring fields.
Generator -	with an output capable of running the video projector 50/60Hz

The four principal objectives of the trial were to:

1. test the technical backbone of MIGIS equipment;

2. find out whether our Karen hosts would be willing to use this equipment to prepare sketch maps of their village estate including cultural features, land use systems, natural resources and hazards;

3. see if the map work would serve as a basis on which to encourage participants to talk about their land use problems and how MIGIS might facilitate the process of finding solutions.

[4] This experience was subsequently written up and is to be published as a chapter in a forthcoming book entitled *The Karen of Thailand and Burma* edited by Claudio Delang

4. collect field information which could be used to:
    - evaluate the potential of MIGIS as either a support system for Participatory Rural Appraisal (PRA) or as a valid method in itself;
    - illustrate the MIGIS approach to likely users.

Over a period of eight days we were frankly surprised at both the interest shown and the level of participation. What had commenced as a technical trial yielded far more information than we had been seeking. Apart from the high demand for energy generated by the projector which from time to time powered down, the whole system, including the equipment worked well. Men and women, who at our request worked in separate groups, each drew a detailed map of the village and then quickly learnt to digitized it. More and more people kept turning up to see what was going on.

Partly because of the political context in which we had been introduced residents were keen for us to represent their interests and they wanted us to know about their situation. Using the map as a starting point the people of Ban Huai Hoi talked openly about:

- their lack of title to the land they had worked since the turn of the century;
- their fear of involuntary resettlement;
- further loss of land to the industrial arm of the Royal Forestry Department: and,
- how this loss had resulted in the shortening of the swidden fallow cycle;
- the drop in yields from upland rice fields;
- the endemic shortage of rice;
- loss of irrigated rice fields in land slides;
- the shortage of off farm labour.

At the end of this particularly lively session those present were shown how landscapes could be modelled on computers. Again it was the political dimension that interested the people most. We were urged to produce similar maps of their land. They believed that this would strengthen the case they were trying to make to government officials. Namely that because they had a thorough and intimate knowledge of their land, especially the community forest, and knew how to manage it quite effectively and efficiently through the additional selling point of a distinct cultural matrix, then their custodianship should be acknowledged.

The MIGIS exercise demonstrated how quickly people can accept computer technology and see how it might help them. In fact no essentialist calling cards of what it means to be Karen, or what constitutes indigenous knowledge need be called.

In this case the results we were able to leave behind were unfortunately of little use to either the people of Ban Huai Hoi or IMPECT. Thailand had been taken off the list of countries for which funding was available from New Zealand. The New Zealand team was financially unable to follow up on this work. Our IMPECT partners were hopeful that they might follow up work of their own through a Canadian Amerindian initiative and our CMU collaborators were already heavily committed to ongoing work of their own. A decision was follow up on contacts made in the Hani-Akha network.

YUNNAN - HANI EXERCISE

The first full scale MIGIS trial exercise was mounted in a relatively remote cluster of two Hani villages, Xaishapu and Shangshapu close to the border with Viet Nam in Luchun County, Honghe Prefecture, Yunnan.

It took two years to negotiate an agreement and include all the demands for accountability with the parties engaged including the:

- Yunnan Bureau of Foreign Trade and Economic Cooperation (BOFTEC, Kunming),
- New Zealand Asia Development Assistance Facility (ADAF), Ministry of Foreign Affairs and Trade (Wellington),
- Luchun County (Daxing) and Honghe Prefecture (Gejiu) government, primarily the Environmental Protection Bureau (EPB),
- EU-Yunnan-Honghe Environmental Protection and Poverty Alleviation Project (HEPPAP, Kunming);
- The Honghe Institute of Minority Studies (HIMS, Jianshui)
- The Rural Development Research Centre of the Yunnan Institute of Geography (RDRC, Kunming)

As action research the trial engaged in a wide range of responsibilities. What was expected of each relationship was carefully worked out. The technology was to be transferred to the RDRC. Training in participatory techniques provided for EPB and HIMS. All parties agreed that in the first instance all the information generated by the exercise would belong to the farmers of Xaishapu and Shangshapu and could only be released to a wider audience with their approval.

In accordance with P.R.China law covering access to mapping data the New Zealanders on the team were completely dependant on their RDRC partners for digital data. Language was also a challenge. The New Zealanders spoke only English. In addition to acting as partners the RDRC team translated English and Mandarin. The RDRC team in turn was dependent on our Hani speaking counterparts from HIMS and the EPB to do the Hani – Mandarin translation. Communication was somewhat encumbered and maps and images became the central focus of reports back to the community.

The criteria used in selection of the study area was as follows, that it:

- form a natural catchment;
- be well away from any main road with only walk-in access;
- be representative of Hani communities in Luchun County;
- be neither very well off nor very badly off; and,
- under consideration for development assistance.

The Shapu cluster with a total population of 320 people met these conditions. Initial contact was made with the residents through Mr Li Qibo the Director, Honghe Institute of Minority Studies who eventually in the company of Dr Cai Kui of the Yunnan Institute of Geography arranged with the farmers for us to take up residence between 1 March and the 10 April 1999. The nine people who started with the field team included four Hani, two Han and three Kiwis who shared a kitchen and slept in accommodation scattered throughout the two villages.

The principal objective of the exercise was to demonstrate how a sensitive and flexible approach to the use of GIS and computer graphic can make a useful contribution to the

quality and effectiveness of participatory planning. Xiashapu and Shangshapu were to be given the village reports by the team and their advice sought on how these could be used after the work was completed. The guiding rules were the same as those for any properly conducted participatory exercise or anthropological investigation: share what you have, adopt appropriate behaviour and attitudes, and in the use of both PRA tools and computers: do not allow the technology to lead or in anyway adversely interfere with the participatory process.

The full Mobile Interactive GIS exercise was set up to work entirely within a PLA/PRA context completely dependent on community support, motivated by skilled, muted facilitation. The approach to Shapu was designed to

- record what farmers thought of their situation
- construct a verifiable profile of resource use.
- Integrate local knowledge with information available in the public and official arena (maps, statistics, reports etc.).

To borrow the language of the Sustainable Livelihoods approach MIGIS used a conventional range of PRA tools to establish the farmers:

- vulnerability to shocks, stresses, adverse trends and seasonal shortages;
- pool of natural, physical (infrastructural), financial, social and human assets;
- differential access to, and use made of these assets; and the
- structures and processes in place which could, if farmers chose to, be used to change things for the better (transforming structures and processes).

Computer graphics and the GIS component were used to enhance the results of PRA exercises. Material drawn by the community was either copied directly with digital photographs, scanner, or redrawn in a way which made the content as clear as possible to illiterate farmers by optimising the use of symbols and graphs. Sketch maps of land use were drawn to scale by farmers, field checked by the team and like everything else, projected onto a screen for correction, comment; used as a take off point for broad ranging discussions. The culminating exercise, the preparation of Action Plans provided both an outlet for community work and an entry point for EPB and HEPPAP to carry out development work approved and prioritised by the community.

As can be seen from the images shown in the course of the presentation of this paper and available on the web site http//www.geo.vuw.ac.nz/geography/projects/migis/ the farmers were capable of producing some very sophisticated analyses of their situation. Issues they may not have wanted to introduce into the discussion such as the felling of the forest were broached by the team using a digitised 1990 land use map and comparing it with an updated version prepared in the course of fieldwork. The transformation that had taken place was clear to everybody and greeted with applause by older farmers who had for sometime, without success, been trying to slow the rate of forest clearance because of the impact it was having on the aggradation of stream beds and the erosion of irrigation ditches. The use of GIS enabled the team to quantify and cost aspects of land use so that when the suggestion was made that farmers look at taking land out of production it was possible to do this with reference to a known shared data set and a very clear set of images.

Findings

The farmers of Shapu rely heavily on their ability to manage irrigated terraces cut into the steep slopes (21 – 40^{o}) of surrounding hills (1000m. – 1800m. elevation). There is rarely enough rice to go round and rice yields are supplemented with a range of other grain (buckwheat, corn, wheat) and root crops (sweet potato, yam, taro, cassava). At the time during which fieldwork was undertaken 40% of Xiashapu and Shangshapu householders only had enough grain stored to last five months. Their net income is below the poverty line.

The study found that in their desperation to secure enough food and be in a position to participate in a growing consumer market farmers were felling forest at a dangerous rate. By opening land on steep slopes close to waterways they were actually placing their water supply and their most productive land, the irrigated terraces at risk. As the process of discussion and appraisal proceeded they gradually acknowledged what had initially been unacceptable. Amongst other matters their own action plans were eventually aimed at tackling the land and water issues.

Did the MIGIS exercise work?

The people were remarkably enthusiastic and supportive. Ten Action plans were drawn up by the Shapu farmers. At the end of the fieldwork period the communities had no hesitation in giving the visitors permission to take the results of the study and present these findings to the outside world. The further the study team traveled from Daxing the more enthusiastic was the response. Prefecture officials in Gejui were particularly interested in the results and the EPB subsequently had little difficulty, even in the absence of funding from the EU, in getting additional money to support what were seen to be sensible village initiatives

Information collected in the course of the work could be made available quickly. Before leaving Xiashapu and Shangshapu a copy of the Chinese draft report[5] had been handed to each of the headmen. Within two weeks of leaving the field Environmental Protection Bureau staff at County and Prefecture level as well as senior administrators had seen the same PowerPoint presentation shown to and approved by the people of Xiashapu and Shangshapu for wider dissemination. Within four weeks of leaving the field the 50 page Xiashapu and Shangshapu MIGIS report had been translated into Hani, Chinese and English and copies made available to everybody with an immediate interest in the work.

By the end of the study period the team was convinced that:

- the integrity of the PLA/PRA approach had been maintained;
- the output had been enhanced in a manner that empowered the farmers voice;
- the process of mutual appraisal and sharing of information enabled the participants to integrate local information, priorities and plans with other available data to form a very solid platform from which to launch development work.

[5] Some 90% of the Hani farmers of Xiashapu and Shangshapu are illiterate. Those who can read and write have been educated in Chinese and are unable to read their own language written in pin-yin Roman script. As much as possible script was avoided and wherever possible indigenous symbols substituted.

We felt that as the technology becomes easier to operate MIGIS work will become increasingly common. Computers and GIS are just another vehicle people can learn to drive and put to work. The feasibility study showed that given enough support and conducted by experienced people with a clear sense of PLA guidelines that GIS can be made to work quite successfully in participatory planning.

Results from subsequent evaluations

If the team left the Shapu villages sanguine that a good job had been done it was not without justification. An official appraisal team came to the conclusion that although the technology had not been picked up as vigorously as hoped all of the officials spoken to about the work were pleased with the results[6] Unfortunately this team was unable to reach Shapu to see what had happened on the ground. Late rains in October washed out sections of the only road into Luchun County and the team was forced to return to Kunming. In was not until June 2000 that I was able to return and find out what had happened. The results are instructive.

It is difficult to fault the EPB follow up on the ten Action Plans. Only one Action Plan remained languishing. A promised change in the catchment area for the Shangshapu water supply had not been followed up. The villagers had acted on all others and been given a great deal of help. Farmers were taking a more active approach to rehabilitating land under lemon grass. Villagers had of their own volition closed access to gardens cleared on steep slopes without the collectives permission. Seedlings had been purchased and trees planted through the area. The farmer appointed to a guardianship role was being paid a small honorarium with money collected from each household. The toilets they wanted had been built out of materials provided by the government. They had provided the labour. The position of householders who had formed dry terraces in close proximity to irrigation ditches and were denied access to water was being reconsidered. On land above the village preparations were underway to plant a walnut orchard. The road the people of Xiashapu had asked for in the face of opposition from Shangshapu had been built and thanks to heavy rain was already in a state of disrepair.

As material achievements were reviewed another picture began to emerge. The emphasis on material inputs had a price. The Action Plans worked out with the people of Xiashapu and Shangshapu had become development blueprints imposed by EPB on neighbouring villages. Development work had become focused on Padong the central administrative village. The 16 natural villages consisting of 530 households with a total population of 2,757 people were all being treated as if they faced the same conditions as Shapu. Despite the effort put into training EPB staff in participatory planning not a single participatory session had been held since the MIGIS teams departure. Everything under discussion when we left that required further negotiation, such as the road out of Xiashapu which crossed steep land above Shangshapu fields had been shelved and action taken without further consideration that there might be a problem. Although the farmers had shown considerable panache in writing their own plans they were now saddled with a team of retired officials who had volunteered their time to carry out planning work. Just below Padong the Department of Livestock had set up a suckling pig project on an industrial scale. There was no discussion with the community about the government's right to take the land, and no discussion about who would supply the pig food. A sponsorship

[6] Dowall, Steve and Robert Sowman (1999)

programme had been launched under which the farmers of Shapu were once again going to be reminded that they are less equal than others.

It was quite clear that the MIGIS reports had been used primarily to push a development investment that would demonstrate to the EU that the EPB was more than capable of getting things done in areas classified as the poorest of the poor. What was done followed a traditional top down method with little or no attention paid to the issue of building local capabilities and long term sustainability. Officials can get things done more quickly by issuing instructions. The fact that the officials like the villagers were mostly minority people, Hani and Yi was quite beside the point.

It would naï ve if not precious to declare the MIGIS feasibility study in Yunnan a failure on the grounds that the results became entirely detached from the participatory process but this shortfall cannot be ignored. When heart transplant operations were still news it was not uncommon to hear reports that asserted "the operation was a success but the patient died". In this case the MIGIS feasibility study in itself produced good results but what does this mean if the culture of governance simply does not give a fig for the means by which the results were obtained?

It is not telling anybody here anything new to state that no methodology as a tool, a heuristic device designed to collect, reconfigure and interrogate information can remain detached from and neutral to the specific sociopolitical configuration in which it must operate. It is not that the technology is toxic but the ethical and cultural consideration brought to its application that can poison the experience.

MIGIS IN CAMBODIA – KAMPONG SPUEU EXERCISE

The work undertaken in Cambodia is still in the process of being written up[7]. The MIGIS approach was put at the service of a Khmer managed NGO which is known by the acronym SCALE. As this suggests the project is quite heavily engaged in fish breeding to support farmer based fish production they also promote small livestock and backyard vegetable production. SCALE asked the MIGIS team to train staff to use MIGIS to carryout a baseline study. The study commenced in February and will continue through to the end of July 2001.

The project is using MIGIS to:

- extend the range of their operations from Kandal to Kampong Spueu to the west of Phnom Penh in former Khmer Rouge territory;
- reorient their activities to fit into a Sustainable Livelihoods Framework; and,
- adopt an open, iterative, holistic, participatory approach.

As in North Thailand and Yunnan fieldwork was conducted in villages that are largely without electricity or other reticulated services. On the job training was conducted in three areas chosen by SCALE as representative of a wide range of agro-ecological land types and socioeconomic conditions.

- *Low lying ground*. Kanhchreab village (population 304), Commune Preah Nipean, Kong Pisei District (12-7, 23-4 March);

[7] Fieldwork was conducted between 1 March and 15 May 2001

- *Middle ground*. Khnar Ta Nong (population 291), Commune Svay Rumpea, Basedth District (18-23, 2-3 May)

- *High ground*. Trapeang Thlok (population 843), Commune Svay Chacheb, Basedth District (26-31 March, 11-12 April).

The SCALE - Kinsa Baseline Study was designed and conducted in a manner to make it possible for those managing SCALE's intervention operations to identify appropriate points of entry. PLA/MIGIS exercises were conducted specifically for the purpose of getting farmers in representative communities to show how: their livelihoods are constructed; they might be able to take control of their own transformation; and, intervention might best be articulated.

As elsewhere farmers have responded enthusiastically to the opportunity to talk about their situation, participate in planning their future and it is only villages saturated with aid handouts that farmers adopt a more cautious attitude. Enthusiasm can make crowd control a problem at village meetings but hanging a cotton sheet screen in an open area so that an inside and outside show can be conducted simultaneously make things more manageable.

The GIS component is well served in Cambodia. Unlike Thailand and China a wide range of maps are available in digital form and there is no restriction on access to aerial photos which can be assembled as mosaics, corrected for position and used as overlays.

The technology is straight forward enough for any reasonably talented computer enthusiast to master. Within 24 hours of arriving in a village, skilled facilitators, in this case the Cambodian team, could facilitate the drawing of a social map, transfer it onto a sheet of paper, have it photographed and digitised, the names entered on a spreadsheet and a wealth ranking exercise completed. Before the end of the third day it is possible to have a transect description of land use supplemented with either a land use sketch map drawn to scale or where an orthophoto is available a detailed map showing a sample of individual holdings as a triangulation of wealth ranking. The work initiates activities that place cooperating communities in a participant rather than a recipient role, effective connections are formed, and a foundation laid for an ongoing relationship of substance.

Closing comments

I do not believe that there is any inherent tension between technology and indigenous knowledge. If there is it should not be blamed on the technology but laid at the doorway of those who have not learned the human skills necessary to negotiate a place, a proper place for it in a social, political and cultural context other than their own. Using sophisticated technology does not automatically place a researcher off side. The work we have done with MIGIS, using a wide range of digital software at least demonstrates how computer technology can be used to stimulate discussion, show communities a respect which is their due. If in the Hani case we could not control the way this information was used we can perhaps at least console ourselves with the thought that given the situation some intervention was inevitable and that

what was done could have been much worse. When I tried to raise the matter of how they had been taken over the farmer simply replied "it is worse to be ignored."

I am not sure what Rundstrom had in mind when he took his rod to GIS as a homogenising tool. GIS like all software can be used at whatever scale, in whatever fashion and for whatever purpose is best suited to the needs of those who find it useful. In MIGIS we have found that using appropriate software in the field can provide a rare occasion for farmers to reflect on their situation, and get those they know come from a more privileged background to use their fancy machines to work for them for a change. I believe the farmers of Xiashapu were telling us a lot when they wrote

Dear Development Workers,
How are you!
We have not seen the working group like your people coming to our village to help and consult on village planning since Liberation. You spent much of your mind and tried your best to come to this remote small village, so we saw the brightness and hope from you. The planning you helped carry out has served as a great inspiration for our village. All the villagers are confident, and will try the best to carry out the planning.
We will not forget this activity….
Thank you, the guests from far away!
All Villagers of Xiashapu

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