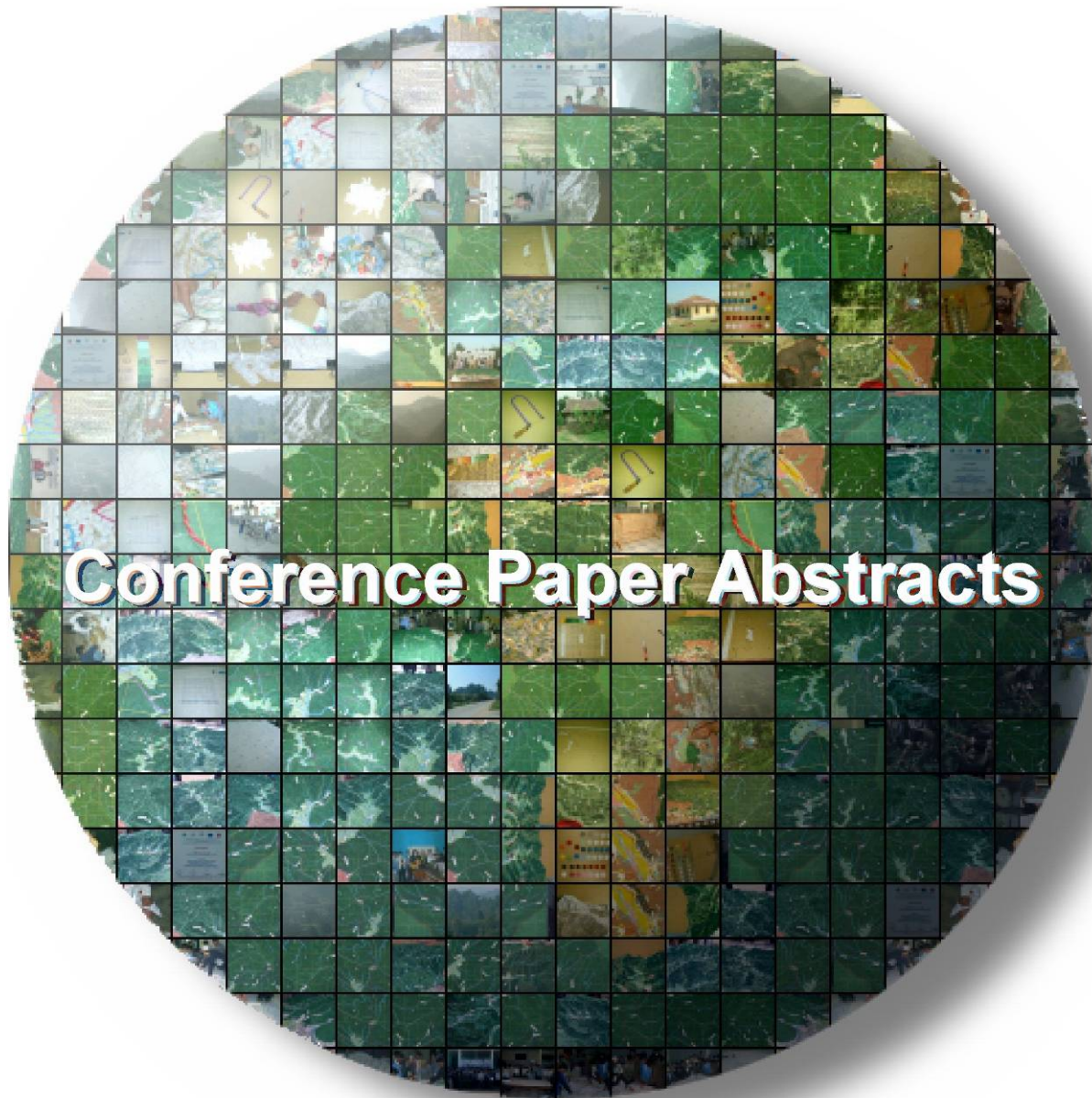


mapping for change



**International Conference on
Participatory Spatial Information Management and Communication
PGIS '05, Nairobi, Kenya, 7-10 Sept 2005**

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Plenary presentations

1. Robert Chambers - Participatory Mapping for Change

Abstract

In recent years, changes in participatory methodologies (PMs) may have been even more rapid than those in spatial technologies. Local people's abilities to make maps only became widely known and facilitated in the early 1990s. Participatory mapping has spread like a pandemic with many variants and applications not only in natural resource management but also in many other domains. With mapping as one element, there are now signs of a new pluralist eclecticism and creativity in PMs. The medium and means of mapping, whether ground, paper or GIS, and the style and mode of facilitation, influence who takes part, the nature of outcomes and power relationships. Much depends on the behaviour and attitudes of facilitators and who controls the process. Many ethical issues present troubling dilemmas, and lead to overarching questions about empowerment and ownership. Questions to be asked, again and again, are:

Who is empowered and who disempowered?
and
Who gains and who loses?

2. Peter Poole - Is there Life after Tenure Mapping?

Abstract:

Tenure maps are made with the intent of producing legally-acceptable evidence of prior land use and occupancy to be used in national or global negotiations. Two strategies for organizing tenure mapping projects are in play. One builds local capacities in gathering traditional knowledge via interviews and sketch maps but out-sources the computerised aspects of map-making to official cartographic agencies. The other uses the community requirement for a tenure map as a context to initiate a graduated training process aimed at competence in and control of the entire mapping process. Community based teams learn to use GPS to produce geographically accurate field maps. A simple computer + printer set-up - has enabled some indigenous associations to set up their own mapping units. Official reaction varies from denial to criminalisation, but the most serious problem is sustainability: tenure maps are one-shot affairs; they get things going but cannot keep them going. What can community mapping teams do next and who will support it? To this point, community mapping has followed the development parable about teaching fishing instead of giving fish. But what if there are no fish?

4. A.H. Pramono - Mapping power: Ironic effects of spatial information technology

Authors: Jefferson Fox*, Krisnawati Suryanata**, Peter Herschok*, and Albertus Hadi Pramono**

Abstract

Over the past several decades rural communities have adopted spatial information technology (SIT) for developing management plans, monitoring change, asserting territorial claims, and other purposes. Yet to date few researchers have examined the socio-ethical implications of these technologies, particularly in developing countries. This paper synthesizes the themes, questions, and concerns that grew out of a June 2003 workshop that convened a number of scholars and proponents of participatory mapping to discuss emergent issues surrounding community-adoption of SIT in Asia. Workshop discussions pointed toward the emergence of ironic effects including increased conflict,

resource privatization, and loss of common property. We also found compelling reasons for communities to continue working with spatial information such as sharing histories of place, enhancing group awareness and identity, and building trust and communication between people. Workshop participants concluded that while communities may choose to engage in mapping for many good reasons such as asserting territorial claims and building community capacity, these communities also need to be made more aware of likely unintended consequences of these actions.

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6. Reiko Yoshida -Cultural Mapping and the Safeguarding of the Intangible Cultural Heritage

Author: Rieks Smeets, Chief, Intangible Heritage Section, UNESCO

Abstract:

This paper illustrates the development of the Convention for the Safeguarding of the Intangible Cultural Heritage in relation to other initiatives of UNESCO in the field of cultural heritage, the current status of the Convention, and the obligations of the States Parties to the Convention. Inventory making is part of the States Parties' obligation; they are required to cooperate with the groups and communities who are the bears of the intangible cultural heritage in identifying their intangible cultural heritage and drawing up inventories. In this connection, techniques of the Participatory Geographical Information Systems (PGIS) used for community mapping may prove to be useful for the purpose of the 2003 Convention. Given that the transmission of the intangible cultural heritage from generation to generation is seriously threatened by such factors as industrialization, urbanization, migrations, armed conflicts, environmental deterioration, consequences of mass tourism and other factors leading to cultural homogenisation, the active participation, cooperation, and contribution of community members and cultural practitioners and the active involvement of the state are necessary for this Convention to yield meaningful results. UNESCO invites intangible cultural heritage bearers, practitioners, NGO's, researchers, and their institutions to become active partners within the framework of the 2003 Convention.

7. Giacomo Rambaldi - Participatory Spatial Information Management and Communication in Developing Countries

Authors: Giacomo Rambaldi, Peter A. Kwaku Kyem, Peter Mbile Mike McCall and Daniel Weiner

Abstract:

The merging of participatory development methods with geo-spatial technologies has come to be known as Participatory GIS and is now an emergent development practice in its own right. PGIS combines a range of geo-spatial information management tools and methods such as sketch maps, participatory 3D models, community-based air photo and satellite imagery interpretation, GPS transect walks and GIS-based cognitive mapping.

Participatory GIS implies making GIT&S available to disadvantaged groups in society in order to enhance their capacity in generating, managing, analysing and communicating spatial information.

PGIS practice is geared towards community empowerment through measured, demand-driven, user-friendly and integrated applications of geo-spatial technologies. GIS-based maps and spatial analysis thus become major conduits in the process. A good PGIS practice is embedded into long-lasting and locally driven spatial decision-making processes, is flexible, adapts to different socio-cultural and bio-physical environments, depends on multidisciplinary facilitation and skills and builds essentially on visual language. If appropriately utilized, the practice should exert profound impacts on community empowerment, innovation and social change. More importantly, by placing control of access and use of culturally sensitive spatial information in the hands of those who generated them, PGIS practice can protect traditional knowledge and wisdom from external exploitation.

Effective participation is the key to good PGIS practice. Whilst the focus of traditional GIS applications is often on the outcome, PGIS initiatives tend to emphasize the processes by which outcomes are attained. At times the participatory process can obfuscate systematic inequalities through unequal and superficial participation. For example, PGIS applications may be used to legitimise decisions which in fact were taken by outsiders. The process can also easily be hijacked by community elites. For PGIS practices to be successful, they must be placed in a well thought out and demand-driven process based on the proactive collaboration of the custodians of local and traditional knowledge and of facilitators skilled in applying PGIS and transferring technical know-how to local actors. Participation thus cuts across the process from gaining a clear understanding of the existing legal and regulatory frameworks, to jointly setting project objectives, defining strategies and choosing appropriate geo-spatial information management tools. The integrated and multifaceted nature of PGIS provides legitimacy for local knowledge and generates a great sense of confidence and pride which prepares participant communities in dealing with outsiders. The process is intended to build self-esteem, raise awareness about pressing issues in the community and produce concrete and sustainable spatial solutions.

8. Michael K. McCall – Precision for Whom? Notes on Mapping Accuracy and Ambiguity in PGIS

The issues to be addressed in this paper are:

How significant are values and criteria of accuracy, precision and reliability in geo-information? What degrees of accuracy / precision are needed?

How do accuracy and inaccuracy of information function in the context of the tasks and intentions of PGIS? Is it feasible to represent non-accuracy and imprecision and ambiguity in geo-information? What are the costs of working with lower levels of accuracy / precision?

The paper follows 3 steps:

- A view of significant features of accuracy and precision in geo-information.
 - The concept and concept of mental maps and mental mapping: the content, and the characterisations of space.
 - Representations in geo-information of ambiguity and fuzziness and subtlety.
-

9. Rachel Olson - Networking the Aboriginal Mapping Community

Abstract

Using maps and geographic information technologies (GITs) has become an important part of First Nations communities in Canada. For those community members engaged in mapping projects, the need to 'network' has been identified as an important aspect of the process. Through lessening the isolation of mappers working in remote communities, the sharing of stories and experiences, and gaining knowledge of technological developments, resources, and skills, networking becomes a crucial component of a mapping project's longevity and success. However, creating successful and sustainable networking environments has been a continuing challenge for those seeking to develop and maintain a community of Aboriginal mappers.

By looking at the Aboriginal Mapping Network, a British Columbia-based program, we can see an example of how a formalized network of Aboriginal mappers was created and maintained through four main focus areas. The successes and challenges of creating this network will be highlighted, as well as issues relating to networking on a regional, national, and international level.

The need for more networking opportunities and networks is evident, however, the process by which this comes about successfully remains a challenge. By examining the roles of formal and non-formal networks, and distinguishing the discourse surrounding 'networking' from the structure and function of a network of people engaged in community mapping processes, a better understanding of how to create successful networks will be achieved.

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10. Peter Kwaku Kyem - Finding a Common Ground in Multi-Party Land Use Conflicts through Community-based GIS Applications

Abstract

A critical issue in PPGIS development involves building a better understanding of how GIS applications impact people and institutions in communities where PPGIS projects are implemented. It is therefore expected that implementation of PPGIS projects would be carried out in tandem with methods designed to assess project outcomes. To date, prescriptions are abundant but few concrete measurement strategies guide PPGIS practice. PPGIS evaluation is fraught with fundamental questions that plague PPGIS projects: will those involved influence the evaluation? Who should participate – the participants or the whole community? What goals should be evaluated and how?

Given that PPGIS practice is still evolving within different socio-political contexts and a changing technology, practitioners stand to benefit by identifying problems early so they can solve them. There is also a need for explicit innovation, evaluation and change in the design and implementation of PPGIS projects. Formative evaluation can prepare the PPGIS practitioner to deal with uncertainty. Process evaluation can explore how public participation activities take place and project outcomes can be assessed to assist with project improvement.

This paper addresses the need to bridge the gap between goals and expectations resulting from PPGIS practice. The paper describes a theoretical framework that can be used to assess the outcome of PPGIS projects. The need to consider multiple goals that reflect the differences in the values, concerns and expectations of participants is recognized. The paper calls for the adoption of methodological pluralism while at the same time developing methodologically rigorous evaluation tools for PPGIS assessment.

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11. Linda Carton - How to cope with map controversies in deliberative policy making

Abstract

How to cope with map controversies in deliberative policy making

This paper investigates the roles that mapping/PGIS activities play –or can play– in the context of a land use planning process. Based on prior research we have noticed that the use of spatial models and geo-information repeatedly deepens the conflict between different actor-coalitions. The debates often focus on particular spots or lines on the map, being an infrastructure, a national park, a development site, etc. Based on the evaluation of various participatory policy processes in the Netherlands, we come to the conclusion that many controversies over (GIS-) maps root in a few typical core dilemmas.

With help of discourse analysis, a method that we adopted from policy sciences, we have analyzed a few cases in depth. From these case studies, we have elicited ten strategies how people dealt with the dilemmas while using map sketches, geo-databases, GIS-analyses, spatial designs or local knowledge. The strategies vary from (1) placing the problem in a wider context –and extending the region represented on the planning maps, through (2) reframing the problem –and recasting the legend items on the map, till (3) acting strategically by manipulating the map picture –for instance by hiding controversial boundaries or by adding ‘lightning-rods’ on the maps (which shift the attention of stakeholders towards other issues). In this paper, we will discuss all different strategies and we will illustrate them with examples. We aim to contribute to the conference topic by addressing concrete strategies how practitioners can cope with so-called map controversies in deliberative policy making.

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Track Presentations

13. Teresa Crowley - Journeys in the Mind: Cultural Aspects in Indigenous Mapping

Abstract

The aim of this paper is to identify the transference of cultural land relationships held by indigenous communities into spatial information systems. Indigenous communities possess spiritual, societal, stewardship and sometimes intangible relationships with land, and have successfully retained spatial aspects of these elements in their cultural mapping systems. Indigenous maps encode landscape relationships into cognitive, visual, verbal and movement communication types. This paper examines the combination of traditional indigenous knowledge with mnemonic and didactic communication systems to enhance spatial transference. The complexities of indigenous mapping programs are often under valued by westerners due to cultural misinterpretations and apparent lack of mathematical precision. This paper attempts to redress those misinterpretations by discussing elements of cultural mapping systems in global indigenous communities. The paper concludes that indigenous mapping programs extend the possibilities of western mapping by accommodating variable communication media and discovers that the perceived void between the two systems may be less than imagined.

14. Gerbrand Mans, Using PGIS to do Community Safety Audits

Abstract

Introduction: Crime is one of the major factors influencing the quality of life of all South Africans and it is therefore a priority to reduce it. To reduce crime, crime prevention is important. Crime prevention is where the focus shifts from the traditional way of the police fighting crime, to the active participation of the community in preventing crime. Doing a safety audit is the first step in implementing a local crime prevention strategy.

Methodology: The hypothesis of this paper is that using PGIS is a very competent method for conducting safety audits. The hypothesis will further be developed by looking at the importance of community participation and the spatial aspect of crime when conducting safety audits. Considerable attention will also be given to the best methods and tools to be used when conducting these audits. To conclude, the effectiveness of the use of PGIS will be discussed utilizing results from a case study.

Results and discussion: Preliminary results indicate PGIS is very efficient in this context. Firstly participation allows the community to take ownership of the local crime prevention strategy. Secondly, because the spatial component of the data is not lost crime prevention hot spots can be identified. GIS allows different datasets to be integrated. This provides a platform for collaborative planning between the community and local authorities.

Methods applied involved integrating the P-Index technique with existing PGIS techniques and useful tools were aerial photographs, global positioning systems (GPS) and the Schutte-scale.

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15. Martin Rokitzki - Participatory Mapping and Demarcation of Land Use Types and Land Resource Features Using GPS and a High-Resolution Local-Level GIS – A Case Study from Southern Malawi

Abstract

This pilot study sought to examine sustainable ways to design land use planning at local level by engaging a combination of participatory methods and geospatial technologies. Participatory mapping sessions using GPS technology aimed to incorporate local traditional knowledge and corresponding spatial information into a high resolution local level GIS.

The GPS mapping service was made available by a SADC/GTZ project (implemented by a Malawian non-governmental organization) to farmers and local authorities free of charge.

What kind of data was collected? During mapping sessions local land users guided the process of mapping of various land use types: agriculturally used plots, individual and village forest areas as well as rural infrastructural facilities. Additionally, data on diverse ecological and economic aspects were recorded in a participatory way. As an example, people's perceptions on soil features and local soil names according to mapped areas were collected.

Through conducting scientific field soil tests it was found that the land user's knowledge on soil texture and stoniness concurs in most cases with the properties examined. These findings were used to develop a local level soil database on the basis of a local GIS.

Apart from soil-related information, the output of the participatory data collection helped to identify prevalent land use pattern in the study area. Furthermore, a series of village maps, land use maps and farm maps were produced. The accurate spatial information is also envisaged to be used in the proposed efforts of producing cadastral plans according to new Malawi National Land Policy.

The study's overall results reveal that the integration of traditional knowledge and modern geospatial technologies facilitates the participatory collection of more meaningful data that can be applied in community-based NRM.

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16. Kate Moore - Spatial Literacy, reflections from teaching international students

Abstract

This paper is a reflective review of the role of a successful GIS masters course, taught in the UK, in teaching international students from many cultures and backgrounds. The Department of Geography at the University of Leicester has just been awarded a Centre of Excellence for Teaching and Learning for its MSc in GIS teaching. In conjunction with two other UK universities it is setting up a £3.9 million, five-year project to develop concepts and teaching materials to promote Spatial Literacy in Teaching (SPLINT). This resource will set national and international standards for spatial literacy (Tate et al, 2005). In the past teaching has been primarily based on the understanding of spatial concepts from Europe and America. This paper will review spatial concepts from other

cultures and sources; compare international methods of spatial thinking and investigate how these can be incorporated and integrated into GIS and GIS teaching.

It is envisaged that future research will link with partners in developing countries and contribute to the development of a post-colonial GIS through linking research by Raghuram & Madge (2004) and developments within SPLINT. By developing an understanding of different forms of spatial literacy it is hoped that it will inform researchers, governments and non-governmental organisations and educators. More importantly, it will empower local people with a new synthesis of spatial concepts allowing them to work together with other stakeholders using their own metaphors and visualisations.

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18. Yih-Ren Lin - Whose Tradition? Whose Territory? A Critical Review of Indigenous Ancestral Domain Mapping Project in Taiwan

Authors: Yih-Ren Lin* and, Da-Wei Kuan**.

Abstract

Ancestral domain mapping has given rise to public attention in Taiwan while it was proposed to resolve a national park setting conflict in 2000. Since 2002, Taiwan government launched a nation-wide project by using GIS to survey the traditional ancestral domain of all the indigenous communities. This paper discusses the epistemological controversy and methodological limits of mapping, particularly by applying GIS in defining the traditional ancestral domain of indigenous communities in Taiwan. It also examined the context of ancestral domain mapping survey in Taiwan and its empirical implementation, with both literature review and participant observation. This paper points out even though the state-driven project meant to authorize indigenous communities to map their own territories by modern techniques like GIS or even called participatory GIS at its surface level, it overlooked the nature that boundaries are usually flexible and fluid in many indigenous cultures. Compelling or encouraging indigenous communities to identify concrete boundaries is not only misunderstanding but also undermining local indigenous knowledge. Once boundaries mapped, new conflicts emerge along with the diminishment of flexibility. Meanwhile, the misinterpretation problems of ancestral domain mapping will leave both government agency and indigenous community members to question the legitimacy of the map. In conclusion, we suggest that it is more appropriate for "indigenous ancestral domain mapping" to be a grassroots movement based on indigenous peoples' intra- and inter-communication and further critical capacity-building than a state-driven project to identify geo-political boundary in present Taiwan.

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19. Sheri Longboat - Traditional Land Use Mapping with GIS

Abstract:

With the increasing availability of technology, the importance of implementing land based technologies for First Nations' traditional land use mapping also continues to increase. Tools such as geographic information systems (GIS) and global positioning systems (GPS) have provided communities a common technical foundation for communicating cultural identity and preserving sights of traditional significance. Traditional connections to the land are now being documented, first on hard copy maps, and are then transferred into digital information systems. These traditional land use maps have become the foundation upon which other forms of community planning and development information are added to create culturally relevant community-based management systems unique to the needs of each community. Connecting information to the land is not new for First Nations. However, as communities begin to engage in these new mapping technologies, expanded opportunities which allow for the expression and communication of cultural identity within contemporary land management activities, have emerged. As oral tradition meets modern technology, communities are challenged with a new variety of methodological and technological issues. This presentation will discuss GIS as a tool to support cultural heritage preservation through the identification, location and protection of traditional land use and sites of cultural significance.

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20. Silika Tuivanuvou - Resource Use and Development Planning, and Safeguarding of the Intangible Cultural Heritage in Fiji: Lessons Learned from two Participatory Spatial Information Management and Communication Processes

Authors: Silika Tuivanuvou (a), Giacomo Rambaldi (b), Penina Namata (c), Sukulu Rupeni (d), Etika Rupeni (c)

Abstract

In the Fiji Islands there is a strong Government move towards increasingly delegating the management and protection of terrestrial and coastal resources to local communities and formalising the safeguarding of tangible and intangible cultural heritage to traditional custodians. Decisions on the access to and use of, the knowledge and traditions associated with cultural heritage, have always been and should continue to be, the domain of traditional custodians. In order to assist local communities to sustainably manage their resources some Government and Non Government Organisations are working collaboratively with communities using a range of techniques to map their knowledge and resources. This paper seeks to compare community-based mapping exercises undertaken on the Beqa and Ovalau Islands, and assesses the critical steps and human dynamics that emerged in the two processes.

In September 2004 the Ministry of Tourism, Beqa Island Tourism Council, University of the South Pacific and the Native Land Trust Board assisted the communities of Beqa Island to initiate a participatory planning process based on the use of orthophoto-maps (aerial photography corrected to fit a map coordinate system) at village level. The objective of the project was to develop a "Resource Management Plan" for the Beqa Island area by empowering local people to participate. The process involved approximately 60 villagers who collaboratively, mapped the use, control and access of terrestrial and coastal resources, and places of cultural and historic significance. However, due to lack of funding, the information that was gathered and digitised could not be used – as of the writing of this abstract - by the resource owners to achieve the objective.

In January 2005 the Fiji Locally Managed Marine Areas Network (FLMMAN), assisted by a range of Government and Non-government organisations(*) initiated a comparable process on Ovalau Island with the objective of supporting local communities in developing sustainable resource use plans. The core of the initiative centred on a Participatory 3D modelling (P3DM) exercise, which was held on Ovalau in April 2005. Almost 150 representatives from 27 villages across the island participated in development of the model. Participants then collaborated using the GIS data captured from the model to prepare the sustainable resource use plans through a series of workshops. This paper details this P3DM exercise and the follow-up activities undertaken on Ovalau Island, which focussed on ensuring local ownership of both the process and outputs. The exercise revealed and depicted a wealth of local spatially-defined knowledge, with 80 categories represented in the legend. The exercise also highlighted the willingness of elders to utilise the knowledge they transferred to the model and depicted in maps, to preserve and transfer traditional knowledge to younger generations and to plan sustainable resource management.

**) WWF South Pacific Programme (WWF-SPP), Technical Centre for Agricultural & Rural Cooperation (CTA), Native Lands Trust Board (NLTB), National Trust of Fiji, Development of Sustainable Agriculture in the Pacific (DSAP) Project (SPC-DSAP) and the Lomaiviti Provincial Council, Ministry of Fijian Affairs and Provincial Development.*

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21. Pascale de Robert - Cartography with indigenous people in Brazilian Amazon: the power of maps in the Kayapo's experience

Authors: Pascale de Robert*, anthropologist; Anne-Elisabeth Laques**, geograph;
Jean-François Faure***, geograph SIG.

Abstract

The Brazilian Constitution of 1988 recognized for indigenous peoples their original right over the lands that they have traditionally occupied. At the present day, about 20% of the Brazilian Amazon are considered indigenous territories and it was shown that they have a very important place for forest conservation. Nevertheless, in some regions like South Para where are living the Kayapo Indians, there are strong pression on lands and

natural resources and very few cartographic information for indigenous people control or manage their land. A series of maps was made with and for the Kayapo with a view to showing how the indigenous land was surrounded by grazing land and to spatialise naturalist knowledge in gardens and forests around one of the village of the Terra Indigena Kayapo named Moikarako. When the Kayapo realised the power of these documents, they expressed their interest instead in the construction of maps representing the whole indigenous territory and decided to give a politic orientation of their cartographic work. These maps highlight the territorial and social unity that the Kayapo wish to emphasise and are thus a particularly useful instrument in some negotiations with other people. They also try to translate some of the indigenous point of view on geography, history and nature. We will show the different steps of the experience from 1999, when we begin to work with a set of Landsat images in Moikarako, to the present with a project between Kayapo and Yanomami people, who will be mapping together in their both lands.

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22. Gerald Chiwozva - The role of Standards in Participatory Geographic Information Systems' (PGIS) practices.

Abstract

The main objective of this paper is to reveal the role of standards in Participatory Geographic Information Systems (PGIS) practices and to identify how previously isolated and marginalized groups of society can take part in geographic information capture, exchange and analysis, and, in turn, use the information for decision making. An attempt is made to emphasize on the need to adhere to standard practices in gathering, synthesis and dissemination of geographic information in the form of digital data sets and models.

The main challenges though are in the proper implementation rather than preparing and/or choosing of appropriate standards. Standards harmonize operations and eliminate inconsistencies in production of geographic information to level out any data gaps and/or overlaps which might, otherwise, be inevitable in managing and communicating spatial information. Standard data-generating software tools have to be introduced if information integrity and accuracy has to be ascertained. Besides, this enhances inter-operability between data users and user systems.

The paper also explores avenues to seek informed participation of all sectors of society by instilling confidence, to community groups, with regards to ancestral land and natural resource ownership in a manner that does not conflict with their perceptions on cultural, ethnic and gender positions as well as their views to heritage preservation. The issue, really, is that communities need to be guaranteed that any geographic information of a culturally sensitive and confidential nature remains so in order to protect traditional knowledge from external exploitation.

A major area in which standardized spatial information has been used is in the Spatial Development Initiatives (SDIs). These have been put on board to unlock latent economic potential in previously under-privileged and isolated geographic areas. The paper concludes by showing how these SDIs have benefited from standard practices involving digital mapping technologies.

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23. Tsion Lemma - Combining Urban Appraisal Methods, RS and GIS for Data Collection to Support the Development of Slum Improvement Policies.

Authors: Tsion Lemma, Richard Sliuzas and Monika Kuffer

Abstract

Slums of the world have been given a high priority on the global agenda. The UN Millennium Declaration Goal 7 – Target 11 aims to improve the lives of 100 million slum dwellers by 2020. Also local governments are making an effort to localize and attain the goal. However, the scarcity of relevant data coupled with lack of both human and financial resources for data collection and analysis is highly constraining the whole process. Acquiring comprehensive slum information to support slum improvement policies in cities with extreme resource constraints requires fast and efficient methods for collecting relevant information to support such policies. In view of this, the methodology presented here has focused in on the combination of GIS and local knowledge comprising an integration of different techniques and methods. Rapid Urban Appraisal methods, RS and GIS technologies are employed to capture relevant data in a cost-efficient way, for the case of Addis Ababa, Ethiopia. A particular emphasis was given to use the knowledge of local actors from all administrative units in Addis Ababa. The result is finally compared with a sample survey dataset of UN Habitat. The comparison has demonstrated that the methodology developed in this research is effective and applicable for providing data for slum improvement policy.

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25. Ermias Aynekulu - Participatory Land use/cover change mapping using PGIS (A case study in Tigray, North Ethiopia)**Abstract**

The research was conducted in Tigray, Ethiopia. The study area is characterized by severe land degradation, deforestation and soil erosion. The land use/cover change dynamics was also high. The research was conducted to answer questions like past and existing land use system (about 30 years ago), understand causes and consequence of the changes, predict what the future will be and understand farmers capacity in mapping changes using PGIS. Three places were selected from the watershed and the study was conducted with the participation of elder farmers living in the area for longer time. Farmers were asked to map the past land use type on the ground using soil and stone which later transferred to paper maps. Moreover, to map past landuse types,

farmers indicate boundaries and mapped using GPS. The existing land use/ covers were delineated using aerial photographs and ground survey. The changes in land use/cover types were then calculated using GIS (ILWIS 3.1 soft ware). The result indicated that the change in land use in the last decades is very high and change of forestland and grazing lands to arable lands were found to be the most common ones. It was also possible to observe that farmers are capable of mapping the natural resources around them, understand and quantify changes, degradation process and could also predict future conditions taking their experience into consideration. Although, farmers have difficult in remembering date by figure, they are good at associating changes with events like drought year, marriage ceremonies form their family, relative or neighbors, government change, land redistribution time, death of local leader etc.

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26. Peter Mbile - Participatory Geographic Information Systems (PGIS) in Managing Landscapes: PGIS as a platform for mitigative, deliberative management of complex environmental systems.

Authors: Mbile P (a), Russell D (b), Degrande (c), Tchoundjeu Z (d) and L Steel (e)

Abstract

With increasingly stronger links between community vulnerability, marginalization and environmental degradation being established in the African humid tropics, efforts to positively link environmental management and livelihoods - the basis for the Integrated Conservation and Development Projects (ICDP), initiated in the 80s, are taking a new turn. Consensus amongst practitioners are that, within their limited geographical scales, previous ICDPs neither failed to master the existential issues of indigenous man and his natural environment, nor succeeded in capitalizing on meaningful interdependent processes that can produce positive 'economies of scale' both for livelihoods and for a mitigative, deliberative management of environmental change. The concept of landscape management which finds its scientific basis in complex systems theory may perhaps hold remedies for these past failings.

Our thesis is therefore that, unless flexible, mitigative and deliberative 'safeguards' are integrated into environmental management, through an iterative process of dialogue, transformative learning, communication, reform and action, the concept of landscape environmental management may actually aggravate this previous weaknesses identified in ICDPs in terms of the extent to which the unmitigated disfunctioning of ecosystem processes may persist.

In its role as a regional leader in helping to develop win-win approaches to environmental management, ICRAF, and partners is adapting participatory geographic information systems (PGIS) as part of an integrative, transformative learning and communications approach in building-up mitigative and deliberative management frameworks for natural resources management in complex environmental systems of Central and West Africa.

Against a background of deliberative democratic theory on public participation, this paper explores the role of PGIS in mediating the management of such complex systems; wherein as a result of the sheer scale of these landscapes - biophysical, social and

economic; PGIS processes can enable effective dialogue, deliberation and debate as well as mediate frank information generation and communication through a progressive, science-based process for planning actions, organizing resources and monitoring change all geared at mitigating vulnerability within landscapes.

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27. Peter Akong Minang - PGIS and local spatial knowledge utility enhancement for community carbon planning

Abstract

Local communities in developing countries are often data scarce environments, yet accessing payments and benefits for environmental services such as carbon mitigation and certification of forest resources requires enormous technical information. Local spatial knowledge can be a repository to draw from in these communities but its characteristics presents some drawbacks on acceptability. In this paper, we employ Participatory-GIS (PGIS) and assess the "value-added" to Local Spatial Knowledge (LSK) as one route to enhancing LSK for carbon planning within the Clean Development Mechanism (CDM) validation and certification system. We use relevant aspects of the CDM requirements, ISK and PGIS evaluation models to elucidate determinants of knowledge utility. Key broad aspects include process/participation, content, form and efficiency. Indicators for each category are used to interpret empirically derived insight on two CF PGIS applications in Cameroon. While some indicators show improvements in ISK, value added was found to vary with context and also to be strongly dependent on facilitation skills in PGIS processes. We analyse the implications for PGIS use in environmental service / certification contexts and for wider information management within community-based natural resource management.

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28. Handja Georges Thierry - Documentation of landuse by the indigenous peoples of the Campo Ma'an national park and of the DJA reserve through participatory mapping.

Abstract

In the past four years our group has assisted eight communities around the DJA and five others around the Campo ma'an national parks in Cameroon to document landuse. The creation of National parks and forest reserves can have a negative impact on the livelihoods of peripheral populations, especially of indigenous groups whose livelihood depends on the forest. Although these groups carry out agricultural practices, their livelihoods continue to depend on remaining forests that have not yet been destroyed by agriculture or by forest exploitation.

(i) The Cameroon forestry law stipulates that " the creation, extension attribution of a national park, an integral forest reserve, a faunal reserve, a sanctuary, a zoological garden or a game ranch are made possible by a Prime Ministerial decree"

(ii) "The creation and extension of a national park, an integral forest reserve, a faunal reserve, a sanctuary, a zoological garden or a game ranch can only be undertaken after indemnities have been arranged according to the regulations in force recognising the full rights of affected persons".

However, today the legal texts are either not applied due to ignorance on the part of the affected persons as well as due to a lack of political will on the part of state authorities. These mapping activities are aimed at providing local communities with an effective instrument to defend their rights and protect their interests.

Although the results are yet to be fully operational, so far, they have been very useful in engaging dialogue between different actors. Some of the more sensitive results can be the start of a reflection process for actors. And today that the situations of these indigenous peoples are better documented; the process permits the raising of awareness regarding the overall situation of these people.

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30. P. C. Tiwari - Geographic Information System for Participatory Management of Community Wasteland in the Himalayan Headwaters of India

Abstract

During the recent past, the rapid growth of population and the resultant increased demand of natural resources have led to the conversion of large areas of forests, cultivated land and other productive areas into waste and degraded lands, in Himalaya. Even the critical headwaters could not escape this anthropogenic process of land degradation. A considerable proportion of these wastelands is under common property land. The conservation of community forests and other productive areas into waste and degraded land has not only disrupted the fragile ecological equilibrium of headwaters regions, but has also severely affected the livelihood securities and sustainability of rural community as a large number of poor households and socially marginalized people depend on common pool resources for the fulfilment of their basic resource needs, such as, fodder, fuel-wood, grazing, water, etc. in the region. But, so far this problem has not

been perceived properly, and the rehabilitation and management of increasing proportion of wastelands could not find appropriate place in the policy of sustainable development in Himalaya. The sustainable development of rural ecosystem in the region, therefore largely depends on the development of common property wasteland lands through community participation.

A comprehensive wasteland development approach therefore needs to be adopted wherein ecological productive potential along with socio-economic parameters of community wasteland are taken in account after the detailed assessment of the information needs of government departments, and developmental options of the local people. This clearly underline the need of developing a natural resources database for the sustainable development of community wastelands through precise identification and definite estimates of different categories of wastelands in ecological as well as socio-economic backdrops of the regions. Geographic Information System (GIS) techniques, which is capable of detailed analysis of natural resources and handling of spatial and non-spatial databases on both time and cost effective basis, is highly useful tools in mapping, appraisal and management of wasteland in collaboration with local people at grass-root level.

The prime objective of the present work has been to analyze and appraise the common pool wasteland through community participation and generate a natural resources database for the sustainable development of these lands taking into account the physical parameters as well as socio-economic aspects of different categories of wasteland using Geographic Information System, with a view to help implementing various resource development schemes by the local government departments at district and sub-district levels. The headwater of Kosi River in district Almora of the newly carved Himalayan state of Uttaranchal in India has been selected as the site for the implementation of the project.

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31. Dhrupad Choudhury - The Pivotal Role of P3DM in Community-driven Convergence of Natural Resource Management and Livelihood Security in upland Shifting Cultivation Areas: Experiences from Sasatgre, West Garo Hills, Meghalaya, India

Authors: Dhrupad Choudhury*, Atsuko Toda** and Anil, C.N.**

Abstract

Sasatgre is an upland village in the buffer-zone of the Nokrek Biosphere Reserve in West Garo Hills, Meghalaya, India. The predominant livelihood option for the villagers of Sasatgre (and of most upland villagers in North East India) is shifting cultivation. With pressures on land increasing due to promotion of horticulture and cash crops such as citrus and tea as an alternate to shifting cultivation and the inclusion of hitherto shifting cultivation land for the Reserve, the fallow cycles in Sasatgre have been reduced to eight years, marginalizing the practice as well as the practitioners. Alternatives offered have not been universally beneficial and almost all villagers (particularly the poor) continue to practice shifting cultivation. Returns from the practice do not offer much improvement in regard to cash generation and solutions to marginalization have not

been forthcoming. Under the IFAD sponsored North Eastern Region Community Resource Management Project, a fundamental objective has been to find viable livelihood options while simultaneously ensuring environmental conservation. An initiative taken by the project in this regard was the introduction of the Participatory 3-Dimensional Modelling for Perspective Landuse Planning at Sasatgre, West Garo Hills in May, 2004.. The initiative was facilitated by ICIMOD , Kathmandu with technical expertise from PAPIID, Phillipines. The villagers of Sasatgre readily accepted the initiative and through their efforts, the NERCRMP, ICIMOD and PAPIID pioneered the P3DM for the first time in India (perhaps elsewhere as well) to carry out a community driven perspective landuse planning in managing natural resources and livelihood in the context of shifting cultivation. The consequence has been a community initiated perspective landuse planning which not only optimized agricultural landuse in the context of shifting cultivation, but has resulted in offering a way to empower communities to plan their own landuse which results in increases in fallow periods, and hence, should impact on productivity and conservation. The paper shares the Sasatgre experience highlighting the driving forces, enabling environment as well as issues that restrain a wider dissemination and application of the tool.

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32. Stéphanie Duvail - Cartography for local management of natural resources in villages of the Rufiji District (Tanzania)

Authors: Stéphanie Duvail*, Revocatus Nandi***, Pili Mwambeso***, Richard Elibariki**, Olivier Hamerlynck**

Abstract :

As in other countries in Africa, the new Tanzanian legislation on decentralisation allows communities to locally manage their natural resources. From 1998 to 2003, the Rufiji Environmental Management Project promoted such a transfer of authority, from the central government to 4 villages of the Rufiji District in southern Tanzania, mostly for forest resources. Villages Environmental Management Plans (VEMP) have been designed by the local communities. Land-use maps have been produced by multi-institutional teams using Landsat images, aerial photographs, detailed landscape analysis and ground-truthing. Cartography and Environmental Management, carried out in a participatory way, were shown to be efficient tools for the improvement of the communication between local populations, government institutions and researchers. The mapping of land use in the Rufiji District has clarified a fuzzy land-tenure situation, especially in the floodplain. This area, considered as under-utilised by the local authorities, is intensively cultivated by the Warufiji populations who have abandoned the Ujaama village scheme. The mapping of the 4 village forest reserves, by the villagers themselves, equipped with GPS, was instrumental for the official recognition. For improved planning, this participatory land use mapping exercise has to be complemented by a detailed analysis of the economic and spiritual values of the different landscape components, and by a description of the local rules of resource sharing. Village environmental planning can stimulate economic development at a local level but this drive needs to be supported by a strong Government will to empower and to secure the local benefits of this decentralisation process.

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33. Carol Murphy - Changing the maps: development of a community land-use pattern mapping procedure for Namibian communal area conservancies"

Authors: Carol Murphy* and Sandra Slater-Jones** with Simon Mayes#, Elvis Mwilima* and Nathaniel Nuulimba ##

Abstract

Historically in southern Africa, the colonial government made maps. Little cognisance was given at any scale to indigenous information, especially local place names and livelihoods resources. This challenge was taken up by NGOs who used participatory mapping to further their cause in promoting the development of communal area conservancies in rural Namibia. The resultant community land-use pattern mapping procedure was formalised into a guideline document.

Conservancy committee members and staff use these maps in the planning and management of their common property natural resources (e.g. planning for tourism activities, including trophy hunting and rental agreements with private-sector lodges, wildlife corridors to allow the migration of species such as elephant and buffalo and for co-management with the government conservation authorities in the case of national park residents).

By reflecting on the development of this community land-use mapping procedure, this paper documents the way that participatory GIS was integrated with the centrally based (in Windhoek, the capital city of Namibia) GIS institution supporting conservancy mapping needs. Factors that enabled this process included strong support from the centrally based GIS institution to provide the GIS expertise and computer hardware to put data derived from village mapping exercises onto a GIS system. Factors hindering further use of the mapping procedure include resource shortages in the regions (both GIS expertise and access to hardware such as printers to make the appropriate scale maps). Although GPS point data is accuracy obtained, the maps have yet to be ground-truthed and have been criticised for their lack of rigor.

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34. Beatrice Nabwire - Community Resource Mapping in Sustainable Natural Resource Management in SW Uganda

Authors: Beatrice Nabwire and Meshack Nyabenge

Abstract

South-west Uganda represents a fragile ecosystem of complex and interrelated ecology with extreme socio-cultural and biophysical diversity. The area has productive soils and receives bimodal rainfall promoting varied agricultural systems and land use practices. With population growth of 2.9% per annum, this ecosystem is exposed to environmental and socio-economic problems like land degradation, soil erosion, low-income, poor nutrition, fragmented farms and low agricultural output. To mitigate these environmental and socio-economic uncertainties, and continue exploiting these rich natural resources areas, ICRAF and FORRI developed intervention strategies ranging from integrated watershed management to tree germplasm production and distribution. These intervention strategies were supported by community resource mapping for integrating research predefined areas into community knowledge of their own resources. Acquired geospatial data were analyzed to support community resource mapping groups and scientific analysis for assessment of impacts of land management practices, conservation and conflict resolution. Community-based resource managers and local policy makers were trained in geospatial tools and applications. A GIS node was established in Kabale district to support future spatial analysis and information management. This paper reviews how integrated natural resource intervention strategies and community resource mapping were complemented to realize sustainable development action plan in SW Uganda. It also reviews the benefits of community resource mapping in property rights and geospatial technology transfer. Technical backstopping the community effort and capacity building are recommended for sustainable community resource mapping activities.

35. Allan H. Smith - Participatory coastal resource mapping in Saint Lucia: local applications and regional implications.

Author: Allan H. Smith, Caribbean Natural Resources Institute, Trinidad and Tobago.

Abstract:

The need for stakeholder participation in natural resource management is widely recognised in the Caribbean. The number of examples of collaborative arrangements that include the devolution of authority over resource management has increased steadily over the past two decades. However, it is clear that Geographic Information Systems, and more specifically participatory resource mapping, have not yet been used to best advantage in support of these processes. GIS remains largely centralised and focused on national planning issues while many agencies involved in natural resource management have limited capacity to use GIS and cartographic tools for mapping resources and popular knowledge. This study describes a case of collaborative mapping of marine resources in Saint Lucia. It addresses community concerns over declining quality of inshore water and degradation of reefs, leading to the development of a community-managed GIS to support local development planning and reducing pollution. The successful application of participatory mapping at a local level in a typical coastal community suggests that decentralisation of GIS tools could benefit similar communities throughout the region.

36. Stefan Kienberger - PGIS and disaster risk management: Assessing vulnerability with PGIS methods – Experiences from Buzi, Mozambique

Authors: Stefan Kienberger* and Franziska Steinbruch**

Abstract

PGIS methods and methods addressing vulnerability assessments are currently merging at an interesting focal point. Both terms and fields are under discussion in the scientific world as both concepts ask for clearer definitions, review of its relevance and deeper exploration of methodologies.

Within this paper we present the case study of Buzi, Mozambique where PGIS methods were applied to assess the vulnerability of communities to hazards (focus on cyclones, floods and droughts; Project PRODER-GTZ (2000-present)). Primary data was gathered through participatory approaches applying techniques of semi-structured interviews, transect walks and community mapping. To minimize vulnerability to natural disasters the need for a package consisting of programs for poverty alleviation, prevention measures and preparedness activities was identified which should be realized through external sources under the participation of communities. As an outcome of the overall project a manual on Participatory Disaster Risk Management was compiled. To integrate the broad and interlinked concept of vulnerability, including social and natural issues from the global to the local, and to successfully address the main objectives of PGIS, to “participate”, empower and represent indigenous spatial knowledge, a common agreement on objectives, methodologies and a strong legal framework is needed. We describe the process of PGIS within a vulnerability assessment and its legal and regulatory framework. Additionally the relevance of such methods is presently being evaluated and the findings will be presented within this paper. Certain attention will lie on similarities to other PGIS applications and will serve as a basis for discussion within the conference.

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37. Sylvanie Jardinot - Capacity development and participatory tools for improved land and natural resources management at local level, Community of Santo Domingo, Telpaneca, Nicaragua

Abstract

Au Nicaragua, la problématique foncière, accès et utilisation, est une question centrale dans le développement du pays. La moitié des agriculteurs ne possède pas ou peu de terres. L'usage inapproprié de la terre et le faible accès à celle-ci, ainsi que le manque d'articulation entre les politiques foncières nationales et les modes de reconnaissance des droits au niveau local, sont à l'origine d'un contexte fortement conflictuel.

Face à une demande insatisfaite de solutions appropriées, Accion Contra el Hambre, s'est interrogé sur comment aider à la prévention et la résolution de conflits autour des ressources naturelles et aussi comment faire que le processus de reconnaissance des droits, acquis au cours du temps et par le travail du producteur, soit efficient et accessible aux plus pauvres.

La coopérative Gaspar Garcia Laviana, de la communauté Santo Domingo, Telpaneca, avec l'appui technique d'Accion Contra el Hambre ont expérimenté la méthodologie de la cartographie communautaire orientée vers la prévention et la résolution des conflits

d'accès et d'usage des terres et des ressources naturelles au travers du dialogue entre les acteurs concernés et l'utilisation d'outils de précision et faciles d'utilisation (GPS et SIG). 288 familles ont participé au projet pilote et plus de 685 parcelles ont été délimitées. La coopérative compte désormais sur une carte de la communauté et d'une base de données référençant les parcelles et les propriétaires. La méthodologie appliquée a permis d'observer son applicabilité dans la gestion du territoire depuis le local et tout particulièrement dans la délimitation des parcelles et la reconnaissance des droits de propriété mais aussi son utilité dans la planification des ressources naturelles et la gestion des conflits.

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38. Eric Nyadimo -Land Adjudication in Kenya; Time is ripe for Participatory GIS

Abstract

Nearly 40 years later the Land Adjudication Program in Kenya initially designed to take 10 years has adopted a face of permanency. It is no wonder that the intended beneficiaries have developed apathy towards the programme. While many factors have contributed to this, a critical area that needs re-evaluation is the method applied.

From its inception the methods applied have concentrated on technical aspects without taking note of the social concepts. It is notable that the application of the Land Adjudication process has often led to clashes! One of the main reasons being that the communities lack an understanding of the process. They often imagine that their rights to land would be diminished and they therefore resist. It is important for the community to feel ownership of the process and their inclusion and hence participation is therefore critical. This points out the need for community education and a strong point to have participation through PGIS.

The integrated and multifaceted process of which PGIS is a component, gives communities confidence in interacting with outsiders and adds authority to local knowledge. Indigenous Spatial Knowledge (ISK) helps communities engage in peer-to-peer dialogues and promotes their issues and concerns. This paper will argue that PGIS is crucial for the successful completion of Land Adjudication Process in Kenya.

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39. Jon Corbett - Using Community Information Systems to express traditional knowledge embedded in the landscape.

Abstract

Local community participation is increasingly recognised as essential in the sustainable management and use of forest resources. Communities that live in close proximity to the forest need to have their expert knowledge, beliefs and traditional management systems taken into consideration in any sustainable development process and forest management planning. Yet communication between these communities and other stakeholders remains the single most significant constraint to the implementation of community-inclusive natural resource management. This communication constraint is caused in part by the lack of availability of local information and views in a format that can readily be presented to and understood by outside stakeholders.

Forest-dwelling communities have responded by preparing community-based maps that document and clarify boundaries, land uses and other features of traditional territories. These maps have become powerful and successful tools to communicate information to decision-making institutions. However, these maps fail to capture and impart information about traditions, beliefs and management practices that need also to be communicated. Many forest-dwelling communities are 'oral societies' and are less comfortable with documenting their information using the written word. In response to this the Spatial Sciences Laboratories of the University of Victoria designed and implemented a research project that explored the potential for such communities to use computer-based interactive maps in conjunction with digital video and digital photography to manage and present their knowledge related to ancestral lands and traditional land stewardship practices. These tools became known locally as community information systems.

Using participatory methods, the research project has facilitated two communities in West Kutai, on Indonesian Borneo to create their own community information systems. The process involved communities reaching consensus on what information to record, training in the use of the equipment for information gathering, and actual information editing and management. Both communities have captured a wide breadth of information, including current, historical and cultural information, land use management practices, and significant events related to their ancestral lands in their villages. They have demonstrated ability to use the tools to store, manage, access and present their local information. They have also used these tools to communicate with institutions outside of the community, and have succeeded in using their information to influence decision making processes.

The research evaluated the significance of managing, accessing and presenting information using interactive maps, the types of information that the communities choose to record and how these tools and training serve to empower the local community. In examining the impact of the project on the local communities, an empowerment framework was developed to guide the analysis.

This presentation will explain the processes used in capturing data through to developing community information systems. Using multimedia it will illustrate the presentation with examples from the community information systems developed by the communities in West Kutai. It will go on to discuss the impacts of the community information systems on the social roles and power relations of those involved in the research project.

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40. Steven DeRoy - Mapping the Road to Healthier Communities

Abstract

In Canada, the rate of HIV/AIDS cases is growing at an alarming rate amongst the Aboriginal population compared to all other ethnicities throughout the country. The Red Road HIV/AIDS Network Society is an Aboriginal non-profit organization, determined to increase awareness and access to information specific to Aboriginal people affected or infected with HIV/AIDS in British Columbia, Canada.

The use of maps as a communication tool has enabled Red Road to feature the most current listing of AIDS and health services available for a particular geographic region. By harnessing geographic information technologies (GIT's), both an online interactive mapping system and 10,000 map guides for the City of Vancouver have been created in response to the viral epidemic. The map guide is the first of a series of four maps that will serve as a pocket book directory of services throughout the province.

HIV/AIDS is not a disease specific to Aboriginal people, however with the current and growing rates of HIV/AIDS within the Aboriginal population, Red Road is attempting to address this issue and make positive steps forward on the road to healthier communities.

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41. Sulaiman Daud - Participatory mapping and planning of gampongs for the rehabilitation and reconstruction of post-tsunami Aceh

Authors: Sulaiman Daud, Yayasan Rumpun Bambu

Abstract:

Earthquake and tsunami caused a death toll of more than 125,000, more than 93,000 persons are missing, and sheer change of coastal landscapes in Aceh. To rehabilitate and reconstruct the province the Government of Indonesia established the Rehabilitation and Reconstruction Agency (RRA) with a duty, among others, to produce detailed plans based on community interests and needs. It is for this objective that Jaringan Kerja Pemetaan Partisipatif (JKPP) and Yayasan Rumpun Bambu Indonesia (YRBI) make a joint effort in carrying out participatory mapping and planning of gampongs (indigenous villages) in Aceh. This program is to protect the customary rights of community's lands, to stimulate solidarity among the victims, to produce a just spatial management, and to

strengthen indigenous institutions for conflict prevention. The program has three main activities, i.e., participatory mapping, participatory planning of gampongs, and the strengthening of indigenous institutions. The outputs of this program are then delivered to ARR and local governments so that a co-learning process of how to build post-tsunami gampongs can take place.

42. Julius Muchemi - The potentials of Geographic Information Technologies and Systems (GITS) and Information and Communication Technology (ICT) in supporting ethnic minority advocacy efforts in the Eastern Mau Forest in Kenya

Authors: Albrecht Ehrensperger & Julius G. Muchemi

Abstract

This paper looks into some intricacies inherent to the use of Geographic Information Technologies and Systems (GITS) and Information and Communication Technology (ICT) in supporting environmental advocacy, litigation, and government towards reclaiming and consequent management of Ogiek ancestral territorial domains in Mau Forest Complex. The paper pays special attention to the function of information and knowledge as crucial development resources. Further it tries to provide insights into the potentials and limitations of such approaches by taking the example of ethnic minority advocacy and the legal consequences of territorial litigation efforts in the Mau Escarpment of Kenya. The authors argue that timeliness and the accuracy of information are invaluable assets in such a context, involving contradicting interests and various levels of decision-making. These prerequisites have direct implications on the tools to be used for information processing, which in turn have direct implications on aspects of participation, workflow, budget and the perception of stakeholders involved in the process.

The Mau Escarpment, running along the Western side of Kenya's Great Rift Valley, is one of the country's most important water towers and contains some of the largest remaining indigenous forests in East Africa. Lake Nakuru, Lake Baringo and the world famous Maasai Mara game reserve depend on water originating from the Mau, where dramatic forest loss has been recorded especially since the mid 1990ies, leading to severe alterations in the flow regime of major rivers feeding Lake Nakuru, a trend threatening the stability of the lake's ecosystem.

The Ogiek community, counting about 20,000 members, whose ancestral land is located in parts of the Mau Escarpment, has been adversely affected by forest excisions and the reallocation of land to other communities, both allegedly being a move by the previous K.A.N.U. government to win political loyalty, particularly prior to the 1997 general election. This political dimension of the problem has prompted the Ogiek community; through its representative the Ogiek Welfare Council (OWC) to sue the government in several cases of land reallocations and forest excisions. Apart from these legal disputes, the OWC banks on advocacy, information and sensitization efforts to achieve its goals. The organization issues a bulletin and maintains a homepage and a mailing system through which it hopes to convey its views and win political support.

The exact mapping, based on indigenous knowledge, of their ancestral land, of cultural or sacred sites, of forest excisions and their environmental impact, would provide the OWC with a clear information basis and more bargaining power in the frame of their ongoing negotiation process with the government. Though first attempts to come up with such baseline information have been conducted, the OWC has, so far, not embarked onto using GIS, GPS and remote sensing technologies. Consequently, negotiation and litigation processes have often rested on uncertainties, vague

descriptions and expired data, providing the opposing party with ample opportunity and latitude to defeat their complains.

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