COMMENT

Fourteen years of monitoring community-managed forests: learning from IFRI's experience

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SUMMARY

Although community managed forests constitute a significant proportion of the worlds' forests, there is little information about their condition or how they are managed. The International Forestry Resources and Institutions (IFRI) network is a research programme established in 1992 to collect interdisciplinary information about forest sustainability and governance. IFRI is unique in terms of the large number of small-scale sites monitored (more than 350 communities and 9000 forest plots) for more than a decade, under the guidance of strong central leadership, a well defined research framework, relative autonomy of network members, and a strong inward focus. These features have enabled IFRI to have particular impacts on new knowledge, policy and local communities, and capacity building. Lessons about how to further strengthen, extend and sustain these impacts include developing more robust agreement about measures of forest sustainability, building network members' capacities to conduct comparative analysis, ensuring the database meets the needs of multiple users and expanding the membership and outreach of the network.

Keywords: community forests, monitoring, governance, networks, research

Quatorze ans de surveillance des forêts gérées communautairement: leçons de l'expérience de IFRI

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Bien que les forêts gérées communautairement représentent une proportion importante des forêts du monde, peu d'information existe quant à leur condition, ou la façon dont elles sont gérées. Le réseau des institutions et ressources de la foresterie internationale (IFRI) est un programme de recherche établi en 1992 pour recueillir des informations interdisciplinaires sur la gestion et la durabilité des forêts. IFRI est unique pour ce qui est du grand nombre de sites à petite échelle surveillés (plus de 350 communautés, et 9000 zones de forêts) pendant plus d'une décénnie, sous l'égide d'une direction centralisée solide, un cadre de recherche bien défini, une autonomie relative des membres du réseau, et des buts très clairs. Ces éléments ont permis au IFRI d'avoir des impacts particuliers sur les nouvelles connaissances, la politique et les communautés locales, et l'accroissement des capacités. Les leçons sur la manière de fortifier, d'étendre et de soutenir davantage ces impacts comprennent le développement d'un accord plus robuste sur les mesures de la durabilite des forêts, la construction de la capacité des membres du réseau à conduire des analyses comparatives, la vérification que la base de données pourvoit aux besoins des utilisateurs multiples, ainsi que l'extension de la liste des membres et de l'influence du réseau.

Catorce años de monitoreo de bosques manejados por la comunidad: cómo aprender de la experiencia de IFRI

E. WOLLENBERG, L. MERINO, A. AGRAWAL y E. OSTROM

Aunque los bosques manejados por la comunidad local constituyen una parte importante de los bosques del mundo, existe poca información sobre su condición o como se manejan. La red de Recursos e Instituciones Forestales Internacionales (IFRI) es un programa de investigación

establecido en 1992 en aras de recoger datos interdisciplinarios sobre el manejo y la sostenibilidad forestal. El IFRI es un organismo único, por razón del gran número de áreas pequeñas monitoreadas durante más de una década (más de 350 comunidades y 9000 terrenos forestales), y por el fuerte liderazgo central, un marco bien definido para la investigación, la relativa autonomía de los socios de la red, y un enfoque importante hacia el interior del organismo. Estas características han permitido al IFRI tener un impacto especial sobre el conocimiento nuevo, la política y las comunidades locales, y la capacitación. Para fortalecer, ampliar y mantener estos impactos, se plantean medidas como el desarrollo de un mayor consenso sobre la medición de la sostenibilidad forestal, la mejora de la capacidad de los socios para realizar un análisis comparativo, la actualización de la base de datos para satisfacer las necesidades de los usuarios múltiples, y la expansión del número de socios y del alcance geográfico de la red.

INTRODUCTION

Forests owned or reserved for communities are estimated to constitute at least 11% of the world's forests (White and Martin 2002), yet, information about community-managed forests is rarely available to those outside the forest itself. Established monitoring systems tend to be large-scale, national- or international assessments such as the Food and Agriculture Organization's (FAO) biennial Global Forest Resources Assessment or the World Conservation Monitoring Centre's biodiversity maps. Information collected at smaller scales, has tended to be short-term and site specific (Colfer 2005), with little systematic monitoring of comparable sites across countries and landscapes over time. Much existing research on local strategies of resource management has relied on evidence from particular countries such as India, Uganda or Brazil.

One exception has been the International Forestry Resources and Institutions research programme (IFRI). IFRI is a global network of ten research centres that monitor forest condition at the community-level to better understand the institutional arrangements affecting the long-term management of sustainable forest resources. It is unique among efforts worldwide to monitor local level forests. IFRI has worked in 16 countries since 1993. IFRI researchers have used the same set of data collection techniques and instruments across all their sites, and in the process generated a remarkable resource for the large community of scholars, researchers, and others interested in policy making related to community based and decentralized forest governance.

The purpose of this paper is to review the experiences of IFRI to inform other efforts to systematically monitor community-managed forests or conduct network-based investigation of locally managed natural resources. The review is based on visits and reviews of IFRI activities in Uganda, Mexico and Thailand, surveys and interviews with IFRI members, and a global internet survey and interviews with people active in international forest management. IFRI members also actively participated in the review. The paper describes IFRI, its achievements and the challenges it has faced in its development.

ABOUT IFRI

IFRI was established with support from the Food and Agriculture Organization in 1992 to set up an empirical basis for assessing and promoting community forest management. Elinor Ostrom developed and initially led the network from the Workshop in Political Theory and Policy Analysis at the Indiana University. In 2006, coordination responsibilities for the network shifted to Arun Agrawal at the University of Michigan.

IFRI faced certain challenges likely to occur in any long-term monitoring and research network. These include:

- Facilitating collaboration among multi-person teams in multiple locations.
- Ensuring rigorous and consistent application of the methods in each location.
- Comparing social and ecological variables among diverse social, political and ecological contexts.
- Making the best use of vast amounts of data.
- Producing analytical and comparative products relevant to different members needs.
- Working in a funding environment that is not conducive to long-term research programmes that focus on the same set of issues over a long time.

With these challenges in mind, IFRI developed its methods in 1992-1993 based on the Institutional Analysis and Development (IAD) framework developed by Ostrom and her colleagues at Indiana University (Ostrom 2005). The IAD framework constitutes an important analytical tool for examining the relationships among social and ecological context, institutional rules, human actions, and social outcomes[1]. With the IAD framework providing an overarching set of principles to guide research, IFRI scholars created a standardized methodology for fieldwork based on approximately 700 questions in 10 forms (Figure 1). The data collected in the field is fed into a relational database (where multiple databases co-exist in logical relation to one another to capture data at different units and scales) housed at IU. They also established a training seminar for

[1] The IAD framework seeks to understand rules in relation to the physical nature of a good and the features of the community. Rules are examined in terms of three levels: day-to-day decisions about using rules, collective decisions by a community to establish and enforce rules, and the constitutional agreement affecting how rules can be modified. Individual actions are understood in terms of the individual's decisions at each of these three levels about strategic options and role expectations at higher levels (Jagger 2004).

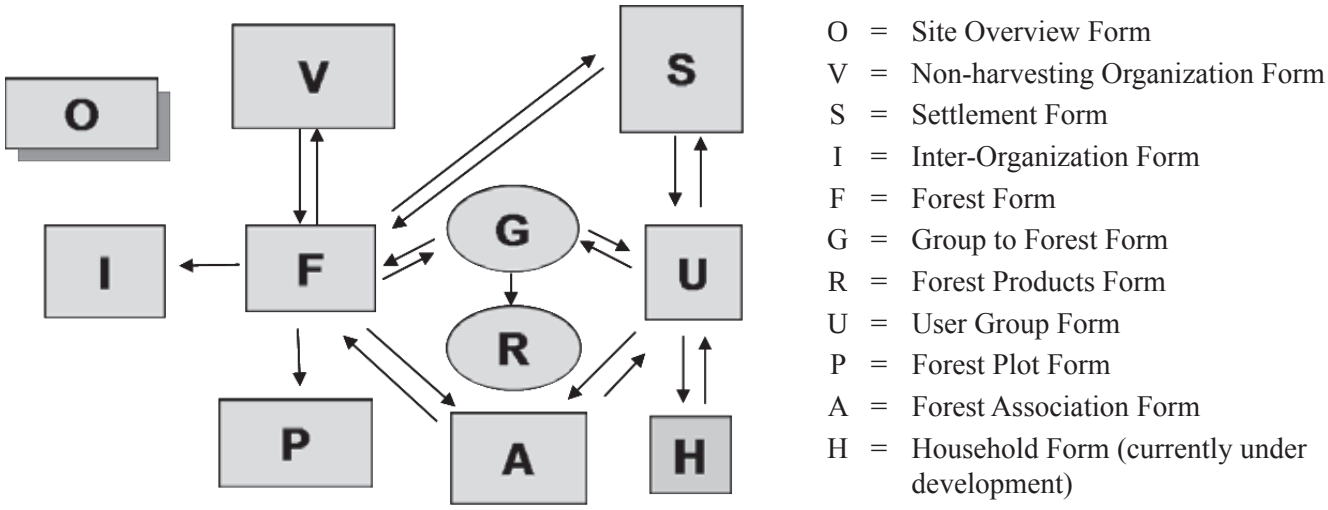
people wishing to use IFRI methods to ensure a common understanding of IFRI principles among researchers affiliated with the enterprise, and also to improve rigor in the application of IFRI methods. The seminar is now offered in alternative years at Indiana and Michigan and has also been offered at a number of research institutions that are in a collaborative relationship with IFRI (e.g. in Uganda, Mexico and Thailand. IFRI was created with the expectation that the network would collect data for a minimum of 25 years.

IFRI did not make their methods widely available until 2006. IFRI's original concern was that people not formally trained in the method would not able to interpret the variables accurately. In 2006, IFRI changed this policy and decided the methods would have more impact in the public realm. All of IFRI's data collection instruments and a manual providing instructions related to field work based on IFRI instruments are now available at www.umich.edu/~ifri.

has been nine years, and two centres have participated now for 13 years. CRCs are distributed across East Africa, South Asia and Latin America. In addition, Indiana University and University of Michigan now collectively have worked in six sites for training and data collection. Although the CRCs are the main actors in IFRI, a significant number of students and other interested individuals also have contributed data to the database after being trained in IFRI methods, even as they have not attained a formal CRC status. Other Ph.D. students and post-doctoral fellows at Indiana University, University of Michigan, and Duke University have used the database for class projects, dissertations, and social-ecological analyses.

The IFRI Coding Manual describes the IFRI research instruments and explains how different variables are to be interpreted. A site is defined as a 'forest [of at least] 0.5 ha containing woody vegetation (shrubs, trees, bushes etc) exploited by three households or more and governed overall

FIGURE 1 *IFRI's research protocols and their conceptual relationships*



IFRI is currently composed of ten active research teams (See Table 1)[2]. Each research team is known as a collaborating research centre (CRC). The initial teams were established through the Forest, Trees and People network of FAO and Elinor Ostrom's own contacts. Later teams were established through word of mouth and based on interest and capacity of those interested in joining the IFRI network. Most CRCs have had at least two to three individuals who have undergone IFRI training. Each IFRI CRC is required to have at least one social scientist and one forester or ecologist, who needs to have been trained in the eight-week IFRI seminar and involved in collecting data.

The average length of CRC participation in the network by the same governance structure.'

Data are typically collected for one site in a two-to-four week period, depending on the size and accessibility of the site. IFRI researchers are supposed to act as field anthropologists by day using group participatory process and then complete the IFRI research instruments collectively at night, after having collated the data gathered through individual interviews, group conversations, and secondary materials.

IFRI's objective is to collect data on each of its sites about once every five years. However, the specific research plans of individuals CRCs and resource constraints mean that typically data has been collected for most sites only

[2] The current network include two additional centres in Colombia and one in Guatemala, however these centres are not active. Two to three other past centres left the network for varying personal and professional reasons. IFRI let go a centre in India when the data did not meet quality expectations.

TABLE 1 *Active collaborating research centers in IFRI, March 2006*

KEFRI, Kenya Forestry Research Institute Contacts: Paul Ongugo/Jane Njuguna
CRC-TZ, Department of Forest Mensuration, Forestry and Nature Conservation Soikoine University of Agriculture Contact: George C. Kajembe
UFRIC, Uganda Forestry Resources and Institutions Center Makerere University Contacts: William Gombya-Ssembajjwe/Abwoli Banana/Joseph Bahati
NFRI, Nepal Forestry Resources and Institutions Contacts: Mukunda Karmacharya/Birendra Karna
UNAM, Instituto de Investigaciones Sociales Universidad Nacional Autonoma de Mexico Contact: Leticia Merino and Ariel Arias
RUPAFOR, AIT (Asian Institute of Technology) School of Environment, Resources and Development Contacts: Edward Webb/Ganesh Shivakoti
SHODH, The Institute for Research and Development Nagpur, Maharashtra State, INDIA Contact: Rucha Ghate
UVG, Professor of Biology and Environmental Studies Universidad del Valle de Guatemala Contact: Edwin Castellanos
IFRI-Bolivia, CERES, Cochabamba Contact: Rosario Leon
IFRI-Bloomington, Indiana, Workshop in Political Theory and Policy Analysis Indiana University Contact: Elinor Ostrom and Burnell Fischer
IFRI Ann Arbor, Univerity of Michigan Contact: Arun Agrawal

once. An IFRI case costs an estimated average of US$6 800 per site. However, individual researchers have often been able to put together an appropriate research team and conduct data collection at far lower costs ranging from $800 to $2 000 per site. IFRI researchers prepare comprehensive site reports after each visit and share these with the forest community that hosted their research effort.

Data collected by the CRC is entered into IFRI's relational database. During the first year the CRC and the researchers who collected the data have exclusive rights to access and analyze the data. Data becomes available to the coordinating research centre (Indiana University until mid-2006, and University of Michigan thereafter) after the second year. After the third year, data is made available to all network members.

IFRI conducts research in a participatory manner with communities. IFRI's research instruments and protocols requires consultation with community members through plenary meetings and the reporting back of results of IFRI cases to communities within two to four months after completion of data collection. In most sites, members of local communities also help collect data. People in the communities reportedly like receiving photographs and pictures of their forests, and the results of the forest inventory and ranking of products.

Since 1993, research using the IFRI instruments and protocols has been conducted in Bolivia, Colombia, Guatemala, India, Kenya, Mexico, Nepal, Tanzania, Bhutan, Vietnam, Thailand, Uganda, and in Indiana and Michigan by CRCs, and as well as in Ecuador, Brazil and Mali by individual researchers. Attempts have also been made to establish CRCs in Cameroon, Madagascar, Switzerland, Canada, Guatemala[3] and North Bengal India. However, in these latter cases, the process did not turn out to be successful.

IFRI's data have been collected for 357 forests in 252 sites. Revisits have been made to 42 of these sites. Close to 9 000 forest plots have been sampled for 500 user groups living in about the same number of settlements. Some CRCs have been able to return more than once to some of their sites (8 sites in Uganda, 2 in Mexico, 3 in Indiana and 1 in Nepal according to the IU database). IFRI is now at a critical juncture with the development of sufficient revisit data to begin analyzing changes in forest management.

In 2000, the network initiated meetings of the CRC directors every two years. Four such meetings have been held, with active participation by CRC researchers and leaders. Sometimes other members of the CRCs have been able to join the meetings as well. The IFRI network also constituted a steering committee in 2004 at its Oaxaca meetings with participation of regional representatives from CRCs in a given region. The Steering Committee is entrusted with decision making related to all collective decisions that affect the future of the network.

IFRI's analysis of data and sharing of results have targeted primarily academic audiences, especially through journal articles and scholarly books. The CRCs also share their findings through the publications of reports and in the classroom. CRC members use informal verbal exchange, workshops, and conferences to further disseminate the findings of their research.

The network has supported IFRI's investigations and research through project-oriented funds from the Ford Foundation, the FAO, the MacArthur Foundation, the National Science Foundation, United States Agency for International Development's SANREM (Sustainable Agriculture and

[3] This was an earlier CRC at the Facultad Latinoamericana de Ciencias Sociales (FLACSO).

Natural Resource Management) project and the Workshop in Political Theory and Policy Analysis at Indiana University. Individual CRCs have raised funds as well from the FAO, Ford and MacArthur Foundations, the InterAmerican Foundation, UNDP, and the WWF. Some CRCs have involved PhD student researchers as a mutually advantageous way of conducting research at a lower cost. One of IFRI's ongoing challenges is its lack of long-term funding.

Despite the lack of long-term funding, IFRI has retained remarkable continuity among its members and CRCs. The average period of CRC participation in the network is nine years, and two centres have participated now for 13 years (Table 2).

Concepts related to the IAD framework recur in IFRI researchers' teaching, advising, publications, development, and advocacy work. IFRI sites are sometimes used for multiple purposes, such as development of community management, training programmes or research for student theses. The IFRI research programme in the broad sense is thus the set of research activities, places and the network that IFRI researchers have created over the past 15 years.

A timeline summarizes the events associated with IFRI's development (Table 3).

TABLE 2 *Years since CRC was established*

Uganda	13
Kenya	9
Tanzania	8
Nepal	13
AIT	8
India	6
Bolivia	10
Mexico	8
Guatemala	3.5

IFRI AND OTHER MONITORING AND RESEARCH NETWORKS

While efforts at forest monitoring have become more common since the early 1990s, IFRI remains unique as the only international and interdisciplinary long-term monitoring and research programme for community-managed forests. It is also the only network that focuses primarily on forest governance.

The Centre for Tropical Forest Science (CTFS) of the Smithsonian Tropical Research Institute may be the only comparable programme although their emphasis is ecological[4].

TABLE 3 *Timeline of development: International Forestry Resources and Institutions (IFRI) research program*

Year	Event
1985	National Academy of Sciences sponsored an international conference on Common Property Resource Management, Annapolis, MD.
1987	NSF grant for a database using case study literature to study CPRs.
1990	Publication of Elinor Ostrom's *Governing the Commons*.
1991	Adaptation of the CPR database to create the Nepal Institutions and Irrigations Systems (NIIS) database. Initially drew data from existing case studies. Later supplemented with fieldwork.
1992	FAO-FTPP sponsored a conference at the Workshop on adapting the NIIS database for the study of forests.* Decision to establish the International Forestry Resources and Institutions (IFRI) Research Program. Design of IFRI coding forms began (and continued through June 1993).
1993	Pretest in Bolivia, Mali, and Nepal. Design and testing of IFRI database application. First three CRC's established (Uganda, Nepal, Bolivia) First use of finalized IFRI forms, by Arun Agrawal in India.
1994	First (semester-long) IFRI Training Program at IUB.

Participants included Ganesh Shivakoti, Lin Ostrom, Jeff and Gabriel Campbell, Clark Gibson, Meg McKean, Arun Agrawal and FAO staff.

[4] The Centre for Tropical Forest Science (CTFS) of the Smithsonian Tropical Research Institute coordinates a network of long-term research that seeks to 1. Determine why tropical forests have high species diversity and how high diversity can be maintained under conditions of human-use. 2. Provide a sound scientific basis for relevant forest management and policy decisions. CTFS works through a consortium of scientific collaborators and institutions around the world. The research is organized around standardized Forest Dynamics Plots. Plots are typically 50 hectares, but can range from 15 to 52 hectares depending on the species diversity.

Other monitoring and research programmes have focused on developing monitoring methods in community forests (the Centre for International Forestry Research's adaptive collaborative management project), permanent plots to track changes in forests around the world (Smithsonian's Centre for Tropical Research Institute), use of remote sensing, GIS, and field information to keep tabs on remaining large tracts of forest through a network of global partners (Global Forest Watch at the World Resources Institute), identifying well-managed forests and their stakeholders (the International Model Forest Network), monitoring forests within a given country (United Kingdom, Canada) or assessing forest for certification (for example, Smartwood). None has had quite the same aims IFRI.

IFRI has evolved to develop five distinctive features that have had both positive and negative effects on network's ability to achieve successful interdisciplinary research on the environment and participatory governance, policy impact and build research capacity in the developing world. Chief among these are the use of a well defined theoretical framework, strong leadership and coordination, relative autonomy of research partners, intensive investment in case-oriented studies of local forest management, and an inward focus. It has enjoyed relative autonomy as well, differing from many other research networks aimed at achieving the mandate of an international agency or as a collaborative initiative launched through intergovernmental cooperation. An examination of these characteristic features may be useful for others interested in forming research networks.

Use of a clearly defined theory and corresponding set of variables

IFRI is designed to apply and test the Institutional Analysis and Development theory and enable it to evolve. Nearly all synthesis articles involving cross-case comparisons have focused on the development of the theory as well as the empirical findings. IFRI is therefore more than a monitoring network. It is also a highly focused research programme.

Strong leadership and coordination from Indiana University

IFRI's leadership maintained clear control over IFRI's structure and research quality by raising funds for a significant proportion of the research conducted by the CRCs, but also through intellectual leadership of the research programme. IFRI's leadership makes the final decisions over changes to the IFRI research instruments with input from CRC members. Communication occurs primarily between the centre and the CRCs, and less among CRCs. Most cross-country synthesis and data analysis has been carried out by researchers connected with Indiana University. Full-time coordinators based in Indiana University have helped facilitate the activities and functioning of the network. Thus, the centralized nature of IFRI is largely because Indiana University established IFRI, has led fundraising efforts, and has a strong concern for maintaining rigor in the monitoring and synthesis of data.

Some network members joined and stayed in IFRI because they were attracted to the strong and high quality leadership. Strong personal bonds between the leadership and individual members have contributed to maintaining long-term commitments of individual members in the CRCs.

The network is starting a new phase in which IFRI will operate as a more interactive network. The significant amount of data collected and the increasing interest among CRC researchers to synthesize findings across multiple locations make this change possible. The network will rely more on regional sub-networks where more local exchange and joint field work and workshops can be facilitated. Network members plan to share intellectual leadership of the network more actively, and promote greater lateral communication among CRCs. These shifts will likely continue to require a strong coordinating body that can bear the transactions costs of organizing and running the network, and for maintaining strong connections across the regional groups. However, as one non-IFRI person said, "the nodes [CRCs] should be deeply embedded locally and drive the network-not have the network drive them."

Relative autonomy of research partners

The IFRI CRCs enjoy autonomy in many regards. CRCs can independently add small numbers of variables relevant to a particular site, study or country as needed. CRCs control their own research design and site selection so that studies can be as relevant as possible to each country. They control the use of their data for the first year and are encouraged to publish independently. CRCs regularly propose and discuss adjustments to the instrument.

There is no overarching policy on the management of CRCs - existing IFRI conventions only define the requirements for their establishment. There is much variation in how CRCs are managed- by individuals, teams, and co-directors with varying levels of participation from students and the institutional homes where the CRC is based. Most CRCs receive support from their home institutions only in the form of space and time to allocate to IFRI activities and have had to be creative about how to organize and run their centres.

Intensive investment in highly local studies of small-scale forests and communities

Due to the nature of IFRI's subject, each case study provides in-depth information about relatively small numbers of people and patches of forests. The studies do not give significant attention to factors beyond the boundaries of the managed forest and its user groups. Such small units taken by themselves might be overlooked as insignificant in studies of forest governance and deforestation at the global or even the national level. Part of IFRI's purpose has been to make these small community forests more visible. Within any single country, however, the number of sites studied and their nature has not been large enough to gain the attention of many policy makers.

Inward orientation and limited focus on external links with other research and practitioner networks.

Despite having generated and deployed significant resources to study local forests and governance processes, IFRI has maintained a low profile and focused its communications on internal connections among the CRCs and IFRI-affiliated researchers. The IFRI newsletter, which provides information on what IFRI researchers and CRCs do, is shared only among these researchers and serves primarily as a vehicle to acquaint them with each other's research and publications. Although many people familiar with governance and community-managed forests have heard of IFRI, IFRI's inward-focus has limited public awareness about IFRI. Research publications have been the primary means by which IFRI has reached out to other researchers and some policy makers. Meanwhile, the inward focus has allowed IFRI to build a strong internal organization.

IFRI'S ACHIEVEMENTS

The features of IFRI's experience as a network are clearly responsible for a number of its achievements and successes. They also indicate lessons for other scholars, researchers, policy analysts or activists who are interested to organize research networks. IFRI's experience may be especially useful for informing the challenges that most monitoring and research networks confront in terms of having real impact. IFRI's impacts on knowledge, policies or benefits in local communities, and capacity building for research are therefore useful areas of evaluation. They reflect lessons the network has learned in terms of other common challenges that networks face, such as maintaining long-term viability, achieving cohesion among members, and securing funding levels appropriate for supporting network activities.

Contribution to knowledge

IFRI case studies have contributed to systematic increments in knowledge about the role of local communities in managing forests. At the country or regional level, IFRI members have helped to document and consolidate evidence about the performance of community forestry and factors affecting that performance. IFRI has contributed important findings to the global policy discussion about community managed forests.[5] Most of the comparative work done by IFRI scholars has focused on advancing the theoretical understanding of the role of group size, heterogeneity, monitoring and social capital in local forest management (Agrawal and Goyal 2001, Ostrom 1999, Dietz *et al.* 2003, Poteete and Ostrom 2004, Gibson *et al.* 2005). Indeed, IFRI has a strong record of publications and citations.

Responses from scholars and policy-analysts outside the IFRI network indicate that IFRI has established a valuable platform for the development of knowledge of community forests. The global survey conducted via internet (64 respondents) showed that 46 percent of the respondents had used IFRI publications or findings. A similar proportion strongly agreed and an additional 30 percent agreed that IFRI findings had advanced the field or enhanced knowledge. No-one felt that IFRI had not advanced the field. The majority of respondents also felt that IFRI had improved the exchange of knowledge (78%) and increased awareness (73%) about local forest institutions.

Policy impacts

IFRI's collaborating research centres have contributed to national policy reforms in selected instances, and also informed development projects and national social movements supportive of community forest management. Policy messages promoted by CRCs have focused on the need for forest monitoring, the conditions for successful collective action, the need for participation by different stakeholders and the potential benefits to national policy makers from recognizing indigenous institutions. About half of the CRCs reported that their findings had been used to design or write a law or policy, change institutions for forest management, inform a policy or public programme, or lobby for policy or legal change. In Uganda, Kenya and Tanzania, CRCs have actively participated in national task forces for policy reform. In India, the government recently accepted recommendations for protected areas made by the national Tiger Task Force and quoted the CRCs work extensively. In Mexico, the CRC assisted the government body PROCYMAF (Project for the Conservation and Management of Sustainable Forest Resources) to diagnose types of community forests and works closely with a national NGO that specializes on pro-community forestry advocacy.

IFRI has not linked as effectively to international policy makers. Everyone interviewed at the international level recognized that IFRI could strengthen its link to policy and practitioners. Linking to other community forestry and forestry networks is also important.

Impacts on communities

IFRI scholars and research centres have had varying levels of engagement with communities beyond those they have researched. At one extreme, the CRCs in East Africa have worked directly with communities to influence local forest management practices and helped to link their experiences to district government and national policy reforms. UFRIC serves in Uganda as an important channel for communication between authorities and communities. In Tanzania, a resource

[5] Consider as examples Krister Andersson's work on municipalities and repeated interactions (2004), Leticia Merino's work on Mexican community forestry, Vogt et al.'s study on land use change in Uganda, Gibson et al.'s (2000) collection of contributions from IFRI researchers and Agrawal and Gibson's (1999) work on de-romanticizing communities.

TABLE 4 *Other impacts of IFRI on communities (number of CRCs, (N=10))*

Improve local capacity to collect information or monitor forest	7
Increased local debate or attention to community forest	7
Generated enthusiasm for more community activities	6
Other positive or negative impacts*	6
Increased local debate or attention to community institutions	5
Built confidence	4
Contributed to reduced conflict	4
Increased legitimacy or status in dealings with other groups	4
Increased frequency of meetings	4
Contributed to increased conflict	3
Created reluctance to have additional research conducted	3
Improved capacity to reach agreement	3
Improved capacity to make rules	3
Improved capacity to lobby for change	3
Provided new rights or other benefits from the national govt	2
Increased collective activities	2
Changed institutions	2
Strengthen rules for forest management	2

* Other impacts: Positive: income generation, forest management plan and new norms of forest use, trained outstanding policy makers; happy and "important" with the materials published, temporary employment for the locals, increased entry to the forest. Negative: assisted illegal harvesters in the community to locate the best trees.

TABLE 5 *How have your own skills or capacities changed? (N=10)*

	No. of CRCs
Knowledge of theory	9
Research methods	9
Policy analysis	8
Travel opportunities	8
Access to publications	8
Scholarly analysis	7
Making policy recommendations	7
Networking or new relationships	7
Scholarly writing	6
Status or prestige	6
Communication skills	6
Access to research funds	6
Workshop organizing	5
Teaching	5
Fundraising skills or opportunities	4
Advocacy, lobbying	3
Other: interaction with grass root organization and communities	1

map drawn for one community enabled the local church to consolidate tenure and alleviate resource use conflicts with the surrounding communities. At the other extreme, the CRC in Thailand has no ongoing relationship with the communities other than to conduct research.

CRCs also reported other general impacts of IFRI on communities (Table 4). The most common impacts were to improve communities' data collection practices, their

attention and discussion about their community forest and their enthusiasm for more community activities. Three CRCs reported increased conflict. In one site, IFRI's work assisted illegal harvesters in the community to locate the best trees.

Capacity building

IFRI has built capacity directly through its training courses and exchange among network members, as well as indirectly through the knowledge IFRI members have passed on to others. In our global survey, 70% of respondents agreed or strongly agreed that IFRI has enhanced research capacities. These capacities appear to be primarily in research design and data collection, and less so in data analysis, writing and policy impact, which partly reflects IFRI's stage of development as a network. IFRI has also significantly expanded the numbers of people familiar with collective action theory and institutional analysis around the world. About 50 PhDs and 125 masters' students have benefited from IFRI training.

CRC members also reported changes in their own capacities (Table 5). All felt their knowledge of theory and research methods had improved. Less visible, but as important, was the capacity building that occurred in each country through CRCs' teaching about research methods and the IAD and common property frameworks. For example, in Mexico, the CRC had given 13 courses based on IFRI concepts. In Uganda, UFRIC trained NGOs and forestry college staff in IFRI methodology. In Tanzania, CRC members trained about 20 natural resources officers from two districts in issues related to the management of natural resources. In Guatemala, CRC members trained 25 professionals from NGOs and government.

LESSONS LEARNED

1. Select initial sites carefully

IFRI's experience indicated the tension between donor interests and the need to choose sites strategically to represent a problem or population, allow comparison or have high visibility for policy impact, depending on the purpose of the monitoring.

IFRI selected sites primarily according to where donors were willing to provide funding, so IFRI sites do not represent particular forests, populations, institutional conditions or threats. There was no explicit research design that allowed systematic comparison across forests of high and low quality, or weak and strong institutions. Instead, IFRI has relied on the existing variation in their large sample. This has posed issues for comparisons within a country and analysis of other subsets of the data however. Once selected, it is difficult to change sites, since comparison over time will be limited.

IFRI's experience suggests it is difficult to control site selection without significant funds. Given the small scale of most community managed forests, choosing sites that have high visibility, policy significance or are associated with development projects or universities that can help disseminate information further would help findings from monitoring have more impact.

2. Balance the manageability and relevance of data collected

Data needs to be manageable, cost effective and relevant to the questions of interest. Because IFRI has both monitoring and research aims, and operates as a network of relatively autonomous individuals, achieving this balance involves three considerations: maintaining minimal data sets, having the option to add more information where possible, and using the monitoring flexibly in different settings to meet different users' needs.

2.1 Minimal data sets

IFRI seeks to collect the minimum set of data necessary for monitoring purposes, yet also collect enough that enables meaningful analysis. IFRI invested significant time and effort to test its initial instrument and build public acceptance for it. As with the selection of sites, the selection of variables has long-term implications. New data can always be added later, but then the period of comparison will be shorter and pre-existing cases will have missing cases for these variables.

IFRI is consequently strict about minimizing changes to the data forms. Inevitably, over time, people request additional variables, but rarely ask to eliminate any. Minor adjustments are only made to the instrument after thorough review and discussion by CRC directors.

One inherent drawback of most long-term monitoring is that it requires monitoring the same precise variables over time. This does not allow the addition of improvements, restricts the addition of new questions or variables that reflect changes in policy or new knowledge. These other issues can be addressed though by using complementary information sets.

2.2 Keep the option of adding more information

IFRI case studies provided the most insights when additional data and methods were used to complement the core monitoring data. Student theses that used the IFRI method were a common example. CRC members said "…no IFRI study should be a stand-alone project." The IFRI instrument is 'barebones, but big bones,' i.e., the information is minimal relative to the need, but implementing the surveys is costly and cumbersome.

Thus while the core methods and database of a monitoring system should be managed conservatively and adjusted in only minor ways to ensure comparability over time, there should be flexibility for people to flesh out the monitoring data with data that is deeper and more comprehensive to allow relevance to emerging issues and new questions.

3.3 Be flexible to meet other users' needs

An international monitoring network differs from a monitoring project in that it depends more on the collaboration among people at the local, national and international levels. A network also serves different purposes for different users-from the local forest users, to national universities, NGOs and policy makers to international bodies and research organizations. It will be necessary from time to time to meet the information needs of these different groups, which may be different from that of the overall monitoring programme.

For example, for policy making, there is often a need to have quick surveys of a large number of sites. Some CRC members have recommended creating a fast track monitoring instrument that would be less expensive and faster, enabling more sites to be studied. Serving national needs for information is an important channel for helping the data to make an impact.

It may be useful to have a minimum number of sites where core data sets are required as a minimum and work hard to maintain continuity at these sites, while fostering more customizing of the monitoring instrument in other locations to local users' needs.

Explicit attention should be given in training and meetings about whether and how to adapt a monitoring instrument in different settings.

3. Create a robust and common agreement about the indicators of sustainability for community forests

Evaluating the health of any locally managed resource requires examining assumptions about what is expected and understanding who set these expectations. There is strong international interest to assess the contribution of forests to environmental aims such as biodiversity. But local people's goals for community-managed forests can vary from protection, production of particular products or services, to conversion or cycles of use for swidden agriculture. Should the health and sustainability of a community forest be based on ecological indicators of what one would expect to find in an undisturbed natural forest, or on a balance of ecological, economic and social indicators that reflect local people's hopes for a modified forest in the long-term? How can forests that are managed for different purposes with different species and in different ecosystems be compared?

Forest health is the dependent variable of most interest to IFRI network. Reflecting a public policy concern for forest conservation, health has been interpreted loosely as forests that approximate the ecological conditions of natural forests. In many of IFRI's studies, however, forest condition has been interpreted broadly. The variables IFRI scholars have used as proxies for biological measures of forest condition include subjective assessments by foresters and/or subsets of users. More recent work by IFRI scholars has begun to incorporate biological measures of forest condition into their analysis (Tucket *et al.* 2007).

IFRI uses a subjective evaluation by users and foresters to determine forest health in a way that normalizes differences across ecoregions and species. The foresters' evaluation depends highly on the familiarity of that forester to that forest though. The subjective evaluations also do not specify criteria. Transparent criteria and clear expectations about management goals would seem important. More than one set of management goals can occur, reflecting the interests of different social groups or public policies.

The network is engaged in an ongoing inquiry to find the most appropriate methods. For instance, IFRI has looked into the possibility of comparing their plots to Gentry plots, which are permanent plots set up in undisturbed forest. The dependent variable would be reported as a percentage of the Gentry plot. While undisturbed forest as indicated in the Gentry plots may a relatively simple indicator of forest quality, it is inaccurate in measuring the quality of a managed community forest. Consequently there has also been discussion of getting standard data on managed forests in each region as an alternative reference point. Forests managed sustainably for timber may be similarly inappropriate if timber is not the primary product. Some IFRI members have used vegetation density or basal area, yet these indicators have little meaning for comparing forests in different ecological zones or managed for different purposes.

For any of these methods, there is a need to address forest variation and influences affecting forests—vegetation types, management types, soil types, patchiness and larger forest landscapes—in sampling and data collection. The current use of sample plots may not reflect larger landscape level changes in the quality of the forest.

The most promising alternative explored thus far would seem to be to conduct a multivariate analysis based on different aspects of forest health, which could include economic, social and ecological aspects, as well as plot and other data. The analysis could be used to classify forest health into different groups. The resulting classification would constitute an aggregate indicator that could be used as IFRI's dependent variable. IFRI also decided in 2006 to use permanent plots rather than new samples to reduce variation over time due to sampling. For any method, forest indicators should need to be tested over time to see whether IFRI methods are precise enough to pick up changes in forest quality in a given time period.

4. Manage costs of collecting good ecological data about forests and invest in the commitment to interdisciplinarity

In addition to the question of how to measure forest health, the cost of collecting ecological data about forests has been a concern in IFRI. IFRI collects more forest-related data than most published studies of community-based management, yet several IFRI members felt that the forest inventory section of the instrument was the most time consuming for the level of analysis it received. While the network is interdisciplinary in design, in practice, IFRI has had a stronger focus on the social sciences, and particularly resource governance.

As a result, some members tended to select sites with small forests to avoid the ballooning cost of sampling larger

forests. Others, who did have interests in forest ecology, sometimes could not complete their studies because vastly more ecological data needed to be collected or felt that they had to sacrifice getting a higher resolution of data to answer IFRI questions. Species classification was especially time consuming in forests with high plant diversity. Some (forestry!) students avoided using IFRI for their thesis because the forestry component was too daunting.

Most members and people interviewed agreed that the forestry component of IFRI needs improvement to refine the indicators, reduce its cumbersomeness and make better use of the data. IFRI could benefit from a tropical forest specialist in the IFRI leadership team, more support of members with forest expertise and more links with the forestry community or others conducting ecological monitoring of forests. Biophysical explanations or causes should be included in the analysis.

5. Build capacity to compare and aggregate data

One of the more important contributions of a research network spanning multiple sites and locations lies in its ability to undertake comparison of causal influences and outcomes across the sites for which data has been collected. Although IFRI has collected a significant amount of data, it has only recently begun to produce large-scale studies that draw on data and findings from multiple locations. Part of the reason is that the network is still developing its capacities to use the database and the advanced statistical methods necessary to undertake such broad scale comparative analysis.

CRC's do not yet fully use the database, especially for cross-country comparisons, analyses over time or quantitative analysis. Many IFRI members have never even tried to access the database. Most members have given priority to analysis of their own case study data. IFRI's experience suggests members of a monitoring and research network need to be encouraged from the start not only to enter data, but also to analyze it.

The difficulty of interpreting data across sites has also limited people's interest to producing syntheses. Rather than pooling data globally, one member suggested that the data should be pooled regionally (or by other shared characteristics) and then identify global trends. IFRI researchers involved in collecting the data should also be broadly involved in the analysis to ensure proper interpretation of variables.

Research members producing the data should be included as authors or at the very least reviewers of any comparative or synthesis work conducted by other network members. Their participation is necessary for credible interpretation of their data, as well as an ethical measure for recognizing each member's contribution to the network.

6. Work to support regional capacities and differences in the network

IFRI's membership contains diverse skills and experiences. CRCs and regional clusters of CRCs have been taking more leadership in the network. The different capacities of CRC members can be used to strengthen the network as a whole. This could include

- Using the comparative advantage that each CRC team and location offers to contribute to the general skills set and knowledge of IFRI.
- Developing more capacity in the regions for data analysis.
- Facilitating cross-visits for field work, capacity building and writing among CRCs. Give travel awards and organize regional conferences or field seminars for CRC people to attend. Create more opportunities for joint writing *in* the region. Take more advantage of CRC members who come for training to stay longer and conduct collaborative fund raising, analysis, or writing.
- Broadening involvement beyond CRC directors by having regional networks in which other CRC team members than just directors can participate.
- Further developing the functions of the steering committee and regional representation in it.
- Continuing regional training.
- Fundraising by CRCs.
- Overcoming language barriers by developing a publications programme in more than one language.

The IFRI training course, offered successfully now in Nepal, Thailand, Uganda, Madagascar, Mexico, and at Indiana University and University of Michigan, has been a major influence in successfully disseminating IFRI concepts and methods. IFRI's experience in trying regionally based courses has improved access to the course reduced costs, enabling IFRI to have an even greater positive impact on capacity building. The sites in the regions are also more relevant to the problems in which most students are interested.

The regional courses are, however, still based on the Indiana model. While the core of the course should remain the same, the regional courses would be richer if they adapted the courses to include more readings, speakers and experiences from their own regions. The regions should use their comparative advantage in addressing institutional and forest issues specific to their regions (e.g., in Asia, the prevalence of social forestry policies and decentralized governments, in Mexico the *ejidos,* indigenous movements).

A centralized course offered in Michigan or Indiana has a networking value in bringing together people from around the world to work with internationally known scholars. It is useful to have a central point for coordinating the training as well.

CRCs have been local ambassadors for IFRI. Their impacts in their countries have helped to extend IFRI more widely than would be possible from any single institution. So far these activities have occurred mostly independently of the IFRI network.

A network would ideally be supportive of these informal efforts. Information about local capacity building activities could be shared in newsletters and biennial meetings. Training materials and presentations could be exchanged. CRCs could explore the possibilities for building capacity

at the level of regional universities and NGOs and building partnerships with these groups to extend IFRI's presence in their countries. The CRC teams should be encouraged to support their staff and graduate students to learn more about the network and participate in IFRI meetings and publications.

7. Develop an open network, with expandable membership and active links to other networks

Any viable and influential network focusing its research efforts on local level resource governance can only meet its objectives if it also attempts to identify and then meet the demands of the larger public and scientific community. At the same time, there are real concerns about maintaining the manageability and integrity of the network. IFRI's past concerns about maintaining careful access to its methods and membership created an exclusiveness and inward focus that eventually detracted from the network's impacts. While this fostered IFRI's successful internal development, many people interviewed described IFRI as 'closed' or 'inaccessible,' and thought IFRI should be more publicly engaged.

Monitoring and research networks may consequently need different tiers of activity to meet their needs. These tiers could be, for example,
(1) A focused research project, including a small number of active research partners.
(2) A much larger and open global network that makes the methods and database of the core research group available, encourages individuals to start their own *independent* research projects and helps to facilitate information among members of the network. The larger set of members would not contribute to the database, but could collaborate on a case-by case basis with members of the IFRI research project to jointly analyze data. They could also be a source of information about relevant policy issues.

8. Use a full-time coordinator to manage the network

Reliance on a network coordinator seems to have been a successful model that facilitated more contact between Indiana and the CRCs. The coordinator was essential to send information, encourage communication, link individuals, identify opportunities for funding, and help organize workshops and reports. Otherwise, as one former coordinator said, there is otherwise the "tendency for everyone to do their own thing" as CRCs have their own priorities.

9. Build incentives for members to stay in the network

Maintaining continuity of network members is crucial to the mission of any long-term monitoring and research effort. IFRI members stayed for personal reasons rather than because of institutional commitments. They explained that they stayed with IFRI mostly because of the opportunity to work with high quality, committed people from around the world and because of the high value of the work produced. Members said the network was professionally rewarding, continued to provide 'research dividends' and gave them international prestige. Opportunities to address important issues, use the database and influence policy were also important. CRCs' main challenge was the stability of funding to do their research.

Of equal concern is a network's capacity to guarantee the availability and commitment of successive generations of researchers. In IFRI, five centres noted that if the CRC director (or in one case the co-director) were not there, the CRC would not continue. While CRC directors represent a mix of people in different stages of their career, it is a risky strategy for any CRC not to have a contingency plan for their absence and a larger team that can support IFRI into the future.

10. Take explicit measures to assure rigor and credibility

IFRI has made a huge effort to be rigorous in its methodology, mostly through careful design of the instrument and standardized training. Most publications have been peer-reviewed. Members enjoy high professional credibility and expect high quality, credible work from each other. IFRI's efforts to cultivate a strong culture of trust and caring have encouraged members to be loyal to the network. Data were eliminated where IFRI felt they were not up to standard. One centre was asked to leave due to poor performance.

Nevertheless, any network requires some internal checks and self-monitoring. IFRI has not had a strong culture of critique, in part because some members have been hesitant to disturb congenial relations. Checks are needed, for example, to ensure the research protocol is being followed and variables are interpreted in consistent ways. One CRC member observed that that continuity and understanding of context tend to be sacrificed if data are collected entirely by non-community members in a given site. They said it was important to involve local people from user groups and local foresters to get the most credible information.

While deviation in the implementation in any research project should be expected, the nature of the deviation should be known to the network so that feedback, support or other follow-up action can occur appropriately. For instance, some IFRI course students confessed they had difficulty making estimates in the dark or neglected to collect the data at all.

An institutionalized mechanism for routinely checking the consistency in the site data after they are entered into the data base is also helpful. Inconsistencies are often only discovered when people start working with the data, which may be months, or even years after the fieldwork was done. It is better to discover any mistakes early. Such a procedure would also allow the network to track trends for any members that consistently produce poor quality data.

Cross-visits in fieldwork could also assure more uniform interpretation of variables and provide transparency, as well as lay the groundwork for collaborative work among CRCs.

Periodic internal and external evaluations are essential. Networks can self-monitor indicators of their quality.

Monitoring can also serve to measure progress in terms of outputs, impacts and supporting processes, such as building

capacity of local research teams. IFRI has relied mostly on four indicators: number of CRCs, number of cases, number of revisits, and publications. Additional indicators are necessary to show whether a network is having larger types of impacts. The criteria of 'Theory of Change,' a programme for supporting social change, are an example of possible indicators:

(1) The development of frameworks, indicators of progress, and other knowledge tools.
(2) Professionalized policy organizations and grassroots groups share strategic research and find it helpful.
(3) Strategic research informs and improves policy interventions in regulatory, legalistic, and judicial settings.

The results of the evaluations and monitoring should feed into periodic revision of the network's strategy and working plans.

11. Enable local development of theory

IFRI's strong IAD theoretical base is both a strength and a weakness. IFRI is designed to test the theory and enable it to evolve. The clarity of the theory facilitates training and uniform use of methods. IFRI's variables can be directly linked to elements of the theory. However, the theory is so strong and has made such a significant contribution to the field that some IFRI members rely on it to the exclusion of ideas that could expand the theory.

While IFRI allows for alternative inquiry, it is not required. Yet some of IFRI's best work reached beyond the 'bare bones' of the protocol. To continue as a research network, IFRI needs to weigh the benefits of testing one model in-depth versus more lateral exploration of models that can lead to a new generation of IFRI. IFRI should foster flexibility and creativity to go beyond the IFRI instrument and IAD model. With their diverse membership, cultural-historical contexts and experience base, IFRI has a strong capability to develop the basic model further, but also to generate new branches of thinking and analysis in which members feel direct ownership.

12. Make extra effort to be relevant to policy and practice

Most research networks are interested to contribute to policy reform, but when it comes to taking action, can be ambivalent about investing in policy or action-oriented work. Their ambivalence usually stems from having lesser capacities, interest or incentives to engage in policy or applied processes, compared to their primary engagement in research.

IFRI intentionally selected CRCs that had an interest in policy and practice, as well as research. Some members' have more interests and capacities, however. IFRI has yet to use this expertise across the network as a whole. Instead it has relied on a decentralized system wherein each CRC has led efforts in its own country to influence policy and development. The consequence has been that at the network level there has been little shared attempt to influence policy. Some CRCs have also not made it a priority. Some have managed their policy efforts and IFRI research projects independently, without drawing links between the two.

IFRI's has been exploring different ways to increase its impacts on policy and practice through, for example:

- Using research questions relevant to existing policy contexts and potential users. For instance, IFRI wants to get a better picture of the distribution of community-oriented conservation.
- Developing research designs locally and internationally that test policy questions. An example is the use of rapid surveys with smaller numbers of variables that can rapidly be answer topical issues of concern to policy makers.
- Using more action-oriented research at case study sites.
- Linking IFRI data to other sources of data nationally to represent larger populations and avoid being 'too local'.
- Integrating IFRI's scientific analysis, statistics and facts into policy messages.
- Collaborating with organizations already engaged in policy reform and advocacy.
- Addressing global agendas and organizations.
- Using an informal advisory committee representing important and diverse networks or audiences to help assess emerging policy issues and potential users of IFRI findings.
- Supporting CRC members with strong understanding of how to link research and policy to share their experiences and insights with other CRCs.

Networks take on their own particular features as a result of the people that make and participate in them, the subject matter they are dealing with and the nature of their activities.

IFRI's experience is but one example of a network's evolution. It amply demonstrates the challenges and opportunities faced by an international network designed to monitor and conduct interdisciplinary research on small-scale, managed natural resources. IFRI has been an immense undertaking to meet diverse goals- from the production of rigorous scholarly knowledge, to informing policy makers about the effectiveness of community management to building the capacity of local teams of researchers and those concerned with forest governance. IFRI's experience shows the practical difficulties of integrating theory, practice and policy.

IFRI's experience suggests that significant tradeoffs exist between an outward orientation necessary to link with the larger publics potentially interested in the network's research and findings, and an inward focus that may be necessary for the development of an integrated analytical framework that allows substantial research related to data collection and theoretical innovation. An initial inward focus may be essential to the early stages of a network's development. A concern for robust and empirically supported theoretical development was IFRI's initial cause for concentrating its efforts inward. Yet there is a risk of extending this inward focus indefinitely to improve methods yet further. Ultimately, the network and its members needed to identify a transition point from which to begin to more aggressively

engage others interested in common research and policy issues. It has reached that point now. With the transition, the network will enter a new phase of development that may well generate quite different challenges.

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ACRONYMS

AIT	Asian Institute of Technology, where the RUPAFOR CRC is located
CIPEC	Centre for the Study of Institutions, Population, and Environmental Change, NSF supported programme at IU
CRC	Collaborating Research Centre
FAO	Food and Agriculture Organization
FTPP	Forests, Trees and People Programme, FAO programme
IAD	Institutional analysis and development framework, developed at the Workshop in Political Theory and Policy Analysis.
IASCP	International Association for the Study of Common Property
IFRI	International Forestry Resources and Institutions research programme
IU	Indiana University, Bloomington
KEFRI	Kenya Forestry Research Institute, founded in 1986, hosts CRC
NFRI	Nepal Forest Resources and Institutions, registered as NGO in 1997
NIIS	Nepal Institutions and Irrigation Systems database and research programme
PROCYMAF	El Proyecto para la Conservación y Manejo Sustentable de Recursos Forestales or Project for the Conservation and Management of Sustainable Forest Resources, in Mexico
RUPAFOR	Centre for the Study of Rural Populations and Forest Resources at AIT, host of CRC in Thailand
SUA	Sokoine University of Agriculture, Morogoro, Tanzania, host of the Tanzanian CRC
UFRIC	Uganda Forestry Resources and Institutions Centre
UNAM	Universidad Nacional Autónoma de México or National Autonomous University of Mexico