Environmental Attitudes of Scientists in Developing Countries:

Evidence on NGOs and Traditional Research Sectors

Patricia Campion*

Wesley Shrum

Department of Sociology

Louisiana State University

Baton Rouge, LA 70803

NGOs represent a distinctive sector in terms of their relationship to the development process. Recently, some NGOs have added a research component to their array of activities, raising the question of whether those who pursue research in these organizations are similar to or different from those in more traditional contexts. Attitudes of NGO scientists are examined and compared with those in universities and national research institutes, drawing on a survey of researchers in Ghana, Kenya and the Indian state of Kerala. Environmental concerns are now important for the majority of researchers in agriculture and environment fields. Two underlying dimensions are identified, one of which is *tiers-mondisme,* the degree to which a researcher adopts a distinctive developing country perspective on environmental issues. Results show that NGO researchers are not generally different in terms of their environmental views. However, national context and participation in the international system affect the degree to which researchers adopt a distinctive developmental perspective.

Environmentalism and the Generation of Knowledge

Agents of development have traditionally focused on agricultural production, which is fundamental to a multiplicity of problems, such as undernourishment, malnourishment, poor health, and national export deficit. Transfers of agricultural technology, changes in the organization of production at the local level, and the coordination of productive and market activities have been important issues for several decades. Recently, however, the international environmental movement has drawn attention to the importance of ecological systems, increasing environmental degradation, and the hidden costs of the intensification of production. Ecologists, often based in industrialized countries, advocate the use of agricultural practices

more sensitive to the value of natural resources, such that these resources remain available for future generations in both industrialized and less developed countries (LDCs).

In 1989, the report of the World Commission on Environment and Development introduced the concept of "sustainability" in international development theories and practices, explicitly linking agriculture and environmental conservation in LDCs. Avowing that we should satisfy our needs "without compromising the ability of future generations to meet their own needs,"[i] it provided actors in agricultural development with a new theoretical frame. Development projects should now be required to take problems of pollution and the finite character of natural resources into account.

Of course, it did not go unrecognized that indigenous peoples had often lived in harmony with their surroundings. The "Traditional Ecological Paradigm" in LDCs grounded the concern for environmental protection in the awareness that the preservation of natural resources is necessary to sustain economic production. The "New Environmental Paradigm," on the contrary, makes environmental protection a priority, over and above economic preoccupations.[ii] This paradigm, quick to attain global influence, is an outgrowth of the environmental movement in developed countries, as expressed in the developmental priorities of the donors they support. Economic and environmental projects now compete for the same limited resources. In LDCs that are still largely dependent on agriculture, the concerns of the "new environmentalism" set constraints on donor-funded projects and have the effect of reducing their commitment to productivity increases that would help to provide food and income for growing populations.

It is in this context that the generation of knowledge plays such a fundamental role in development. The achievement of sustainable agricultural development reflects the same

conflicts between production and ecological values, between competing research priorities, between shifting international and national interests. In many cases sustainable production techniques are not currently available to producers, and techniques developed in the North are not directly applicable to local conditions. Hence, researchers in developing countries are key actors in providing solutions to the problem. They possess both the academic training and the knowledge of local conditions required to develop and validate new agricultural practices. Such knowledge has traditionally been generated by researchers in a limited set of institutions (universities, national research centers (NRCs), and international research centers). Recently nongovernmental organizations (NGOs) have entered the research arena as well.[iii]

A view of science as relying exclusively on universal principles would suggest that the context of research does not matter, since scientists will share the same goals of increasing certified knowledge of the physical world by means of consensual technical and methodological standards. On the contrary, if we assume that organizations reflect cognitive systems,[iv] research goals and processes in NGOs are likely to be different from those of universities or state research institutes. Specifically, scientists working for different types of organizations may have different views on environmental issues.

The questions that motivate the following analysis are (1) the extent to which environmental concerns are present among researchers in LDCs (2) whether researchers in this organizational context (NGOs) possess distinctive attitudes toward environmental and development issues and (3) whether these attitudes vary according to broader contextual dimensions. In the next section, we review the involvement of NGOs in research activities and current views on their structure and ideology. Next, we describe the methodology of the study

and the variables employed in the analysis. Third, we present results that cast doubt on the

distinctiveness of NGOs as such, but reveal a distinctive LDC perspective toward the new

environmentalism.

NGOs and Research

NGOs promote a vision of development that emphasizes a disinterested commitment to

the improvement of poor people's lives, the participation of the local population, and an interest

in sustainable practices. These characteristics have often made them seem ideally suited to

design and implement innovative development projects. NGOs routinely claim to be more

radical than public or private sector organizations and such claims are taken seriously by donors,

beneficiaries, and other groups.

Their advantages stem from a combination of lower bureaucracy and higher commitment

to the people they serve. First, they appear more flexible than the cumbersome public agencies

because they do not rely on complex bureaucratic hierarchies and are subject to fewer rules and

regulations.[v] They are able to modify structures and respond to changes in the environment

more quickly and effectively than government agencies. Second, they claim to be more cost-

effective than the public sector, channeling most of their resources to their beneficiaries rather

than spending them on their own internal organization.[vi] Third, while public institutions or

international agencies traditionally impose programs without consultation of the beneficiaries,

NGOs emphasize the participation of local populations.[vii] Finally, NGOs maintain an

experimental orientation toward innovative technologies and organizational structures.[viii]

Nongovernmental organizations became involved in knowledge generation activities for

a variety of reasons. The most important legitimating reason was their perception that the

existing research programs were irrelevant to the needs of their beneficiaries. Meyer

acknowledges that many NGOs produce research, despite the skepticism of their donors, who see

it as waste of resources and the difficulty of evaluating the benefits of the investment.[ix] NGOs

may also generate alternative knowledge on environmental problems owing to their greater

freedom to select their research agendas than public organizations.[x] However, legitimacy in the

global scientific community depends both on methodological practices and the open publication

of results in conformity with current scientific standards.

Farrington and Bebbington have provided the most extensive series of empirical case

studies documenting the recent development of agricultural research by NGOs.[xi] The issue of

sustainable development and the research practices of NGOs are related to ideologies and

development regimes of donor organizations. They note that NGOs are not all equally

concerned with environmental sustainability. Indeed, one may identify both a production-

oriented approach, advocating the use of external inputs to maximize yields, and an

agroecological approach, centering on low-input technology for cost and environmental reasons.

Moreover, NGOs vary in terms of the strength of their ideological commitments, some

advocating principled rejection (or adoption) of Green Revolution technologies, and others

adopting a pragmatic stand, seeking whatever technology seems best to fit in particular contexts.

The evaluation of NGO impact in the promotion of agricultural technology is difficult because

their goals are not coextensive with those of governmental extension services. The exploratory

nature of NGO research efforts and the qualitative nature of the intended benefits only reinforce

the difficulty of evaluation. Growing attempts at coordination between NGOs and state agencies

may be detrimental or beneficial to NGOs, depending on national context.

The Farrington and Bebbington compilation highlights the specificity of the nongovernmental contribution to agricultural research and indicates their actual variation in ideological commitments and practical activities. The traditional view of scientific method aims at increasing theoretical knowledge via experimentation before applying it to specific, concrete problems. NGOs, on the contrary, try to implement concrete practices for the problems experienced by their beneficiaries in everyday life, but do not necessarily value the theoretical implications of their findings. They seek to introduce a new cognitive system into the field of agricultural and environmental research.

The world views that NGOs bring into the field through their staff are ultimately important factors in determining their choice of projects.[xii] Indeed, part of the flexibility of NGOs, especially compared to the state, is said to stem from a less bureaucratic and hierarchical structure. If this is the case, individual staff members' attitudes will have a greater influence on the whole organization when they work for NGOs than when they work in other organizational structures, particularly those heavily influenced and supported by the state, such as NRCs and universities.

Given the agenda promoted by NGOs and its contrast with universities and national research facilities, researchers who operate from these organizational contexts may be distinctive with respect to their environmental beliefs. We designed this study to examine the relation between organizational sector and the attitudinal characteristics of researchers. Specifically, in their quest to design and implement sustainable agricultural projects, would NGO researchers display a greater commitment to that agenda by showing greater support for environmental

protection? Organizations that support research professionals are subject to their influence and

active participation in the definition and attainment of organizational goals. Hence, the attitudes

of NGO researchers toward sustainable agriculture are worth examining, particularly in contrast

with researchers working in universities and state research institutes.

Of course, the "context" of research represents more than the type of organization in

which a scientist is employed. It depends as well on the level of development of the national

economic, political, and social systems, including the system of research. Each has an impact on

the resources available to researchers and is likely to influence research priorities. For instance,

countries where agricultural production does not meet the needs of the population have a

pressing interest in increasing yields. In the international arena there is a range of influences on

the level of contact that researchers have with industrialized countries.

A recent trend in organization theory that focuses on the relationship between

organizations and their environment, examines the growing importance of the global context for

organizations. Neo-institutional theory argues that it is essential to consider the increasing

phenomenon of globalization to understand the structure of organizations.[xiii] Human rights, a

universalistic ideology, and scientific doctrines are perceived as the main elements of the present

global ideology. The trend toward increasing rationalization stems from the leading role of

Western culture.

NGOs, in addition to the characteristics cited above, aid in disseminating principles of

world culture, including individualism, universalism, rational progress, and world citizenship.[xiv]

That citizens of industrialized countries find it not only legitimate but morally worthy to promote

development by joining NGOs follows from principles of universalism and world citizenship.

Hence, as NGOs are increasingly involved in the process of knowledge generation, even as they employ participatory methods in the identification of needs and the application of indigenous knowledge, they implicitly validate Western views of progress through science. The very notion of empowerment, often associated with sustainability, rests on assumptions about individual capacity to take control of one's life.

In the global community, the professions and scientific community have acquired growing importance as influences on patterns of organization through claims about appropriate methods of understanding the physical and social worlds.[xv] The scientist plays the role of a disinterested actor, providing expert knowledge on the environment so that rational actors can make informed decisions on how to achieve their goals. Researchers in the developing world, especially when trained in the developed world, are expected to be influenced by these claims, as well as the new environmentalism. Their scientific and technological practices resemble that of Western scientific centers, owing both to its direct influence and greater prestige. As environmental concerns diffuse from more to less developed countries, the views of scientists in LDCs may be related not only to these organizational contexts, but also to their experiences in developed countries.

The analysis here focuses on the attitudes of individuals in LDCs that are involved in the generation of knowledge. A series of items tapping environmental and development issues was presented to a sample of 293 researchers in Ghana, Kenya, and the Indian state of Kerala. In the next section we describe the survey and the measurement of both attitudinal dimensions and their predictors, including sectoral affiliation (universities, national research centers, NGOs), the level of development of the national scientific community, organizational tenure, and

cosmopolitanism (the degree of linkage with developed countries). In the analysis that follows, two underlying dimensions of environmental concern are identified based on a factor analysis of Likert scale items. Next we employ GLM and multiple OLS regression models to explore the relationship between organizational context and environmental perceptions.

Methodology

The data were collected from researchers in Ghana, Kenya, and Kerala (a state of southwestern India) as part of a project aimed at understanding the attitudes, organizational contexts, communication patterns, and needs of researchers in developing countries. The sample was selected to represent individuals engaged in agricultural and environmental research in the primary research sectors: state institutes, international centers, universities, and NGOs.[xvi] Locations were selected to represent different levels of socio-economic development, reflected in the development of their research systems.[xvii]

In this study Ghana represents a lower level of development, Kenya an intermediate level, and Kerala the highest level. One commonly-used indicator of scientific development is publication productivity. Both self-reported counts of productivity and counts based on international bibliographies support a ranking of Kerala, followed by Kenya, and then Ghana.[xviii] India possesses one of the oldest and largest national research systems, at the highest level for developing countries. Kenya has one of the largest scientific communities in Africa. Despite the economic downturn of the 1980s it experienced a rapid expansion of its university system in the 1970s and an increase in scientific output. Ghana inherited academic and state research facilities from the colonial period, but economic and political difficulties throughout the 1980s led to

scientific out-migration and a significant decline in scientific output.[xix]

The sample includes 293 researchers working for universities (82 respondents), national research institutes (154 respondents), NGOs (42 respondents), and international research centers (15 respondents). The selection was based on the organizations where these researchers were employed. Organizations were identified through a bibliographic search using international citation indices. NGOs did not appear in such indices and were identified through informants in each location. After arrival, we spent one week interviewing individuals to locate NGOs with research involvements in the designated areas. The final selection of respondents was made on site. Owing to the remote locations of some organizations and the five-week research period available in each location, it was not possible to make repeated visits to some locations.

The survey instrument centered on the institutional conditions for research in developing countries, attitudes toward environmental, productivity, and sustainability issues, questions on major project activities, international and national professional networks, organizational context, productivity indicators, and a variety of background questions. The set of attitudinal items, presented in the form of Likert scales, is listed in Appendix A.[xx]

The attitudes of respondents from different sectors were compared using two approaches. First, an exploratory factor analysis revealed two underlying dimensions measured by the responses to individual items. We created factor scores indicating these dimensions. Mean differences between sectors and locations are examined in one-way and two-way general linear models, treating factor scores as continuous variables. [xxi] The analysis by sector tests the hypothesis that NGO researchers are more concerned about environmental issues than other researchers. The analysis by location tests the hypothesis that opinions are related to wider

contextual influences. A two-way model determined whether the effect of sector varies by location. In the second part of the analysis, we calculate a multiple regression model to establish whether the relationships revealed in the analysis by sector and location hold after controlling for organizational tenure and cosmopolitanism.[xxii]

A factor likely to affect attitudes is the degree of cosmopolitanism, defined here as an orientation toward the international context. The more researchers are affiliated with the global scientific community, the more they will tend to adopt global perspectives and orientations rather than local or national ones.[xxiii] Three variables measure cosmopolitan orientation: (1) the number of articles researchers published in foreign journals; (2) the number of years spent in developed countries; (3) the number of professional contacts in developed countries. Researchers who publish more articles in international journals, have more professional contacts, and more sustained exposure to developed countries should be more favorable to the new environmental agenda.

Organizational tenure was measured by the number of years the respondent had been employed by his/her present organization. Our reasoning in including this variable was that newcomers might be more enthusiastic about new ideas, and hence more inclined toward agendas such as environment conservation. Researchers who have been with the organization longer may be used to conventional approaches and less willing to change. On the other hand, it might be argued that more senior researchers have had the opportunity to witness the failure of conventional approaches and be more willing to entertain new strategies.

Results

11

In the following section, we present results of a simple analysis of individual items for the sample as a whole, by sector, and by location. Next, we use factor analysis to identify two underlying dimensions. Finally, we use multiple regression analysis to examine the relationship of sector and location to these factors while controlling for these other dimensions.

Tables 1 and 2 exhibit the percentage of respondents who agreed strongly with each item.[xxiv] For the sample as a whole, highly favorable attitudes toward environmental conservation and sustainability were expressed. Concern for the future is the variable that addresses the question of sustainability most directly. More than 95% of our respondents agreed strongly with this statement, suggesting that scientists generally do not adopt a purely productivist attitude toward agriculture, but readily accept the idea that production potential must be preserved in the long run. Further, almost nine in ten respondents agreed strongly with the idea that the measurement of agricultural productivity should include its environmental costs.

Attitudes on conservation of resources are more diverse. The idea that resource conservation is important even if it does not lead to immediate gains in productivity (CONSERVATION) crosses all boundaries of sector and location. Three quarters of the interviewees thought that international agencies spend too little on environmental research (SPENDING). Fewer agreed that some natural resources should never be touched. Opinions are even more diverse on items related to environmental quality. Less than half agreed strongly that water and industrial pollution are big problems. A strong minority felt that environmental problems in third-world countries have been exaggerated by developed countries (16% agreed strongly, while another third of the sample agreed somewhat).

Turning to variations by organizational type, Table 1 shows that the chi-square test is

12

significant for only one item ("There are some natural resources in Kenya/Kerala/Ghana that should not be touched no matter what the short-term benefits."). This finding indicates that, at least for these bivariate associations, organizational type does not strongly predict environmental attitudes. Moreover, this difference is not in the expected direction: NGO respondents are *less* likely to agree than those in universities or state research institutes.

The analysis in Table 2 reveals more significant differences, indicating that location--a broader measure of context--is a better predictor of attitudes than organizational type. In general, Kenyans display the most favorable attitudes to environmental conservation, while Keralan respondents display the least. Kenyans display particularly favorable attitudes on the necessity for developing countries to pay attention to environmental issues (EXAGGERATION, OBSESSION and HAS INCLUDED), and the problem of erosion.

Keralans have less positive attitudes on the importance of environmental issues for developing countries (EXAGGERATION, OBSESSION and HAS INCLUDED), and the introduction of measures of environmental protection in research programs (MEASURE COST). Keralan scientists are more likely to think that international agencies spend about the right amount of money on environmental research (SPENDING). Ghanaians are generally intermediate in their expressed views, but have noticeably less positive attitudes on resource conservation and the importance of land and water conservation for agricultural production. The largest contrast is between respondents in Kenya and Kerala.

Kenyans are less likely to agree that environmental issues are a rich-country obsession, while Keralans are more likely to agree that their research system has taken environmental cost into account for a long time. However, Keralan respondents are also most likely to agree that

13

agricultural research should focus on productive zones and not marginal ones, while a minority

of African researchers took the same position, and to stress the importance of land and water

conservation for agricultural production (LAND&WATER). India as a whole has reached self-

sufficiency in agricultural production, allowing for a protective view that may be more difficult

to adopt in Ghana or Kenya.

Table 3 shows the results of the exploratory factor analysis. Squared multiple

correlations were used as prior communality estimates in the analysis. Factors were extracted

with the principal factor method, followed by a promax (oblique) rotation. The scree test of

eigenvalues showed that three factors were meaningful, so the rotation was applied on only three

factors.[xxv] For the interpretation of the rotated factor pattern, only items with a loading greater

than 35 for a given factor were said to load on that factor. Table 3 presents the factor loadings

for the eleven statements, including the factor pattern and the factor structure.[xxvi] Table 3 also

shows that the factor loadings have similar values both in the factor pattern and in the factor

structure.

Note that the second factor reveals an expected grouping that is readily interpreted as

indicating adherence to the contemporary environmental paradigm. It groups WATER

POLLUTION, INDUSTRIAL POLLUTION and CONCENTRATE. The correlation matrix in

Appendix B shows that these three variables are positively correlated. Those respondents who

report that water pollution is a big problem in their country also tend to agree that industrial

pollution is a problem and that agricultural research should focus on increasing production in

favorable regions.[xxvii] Since these items focus on the problems of pollution and environmental

conservation, this factor is labeled "New Environmentalism."

The first factor in Table 3 also reveals a cluster of items that pertains to environmental issues, yet from a distinctive perspective relevant to the developing world. It consists of three positively correlated items: EXAGGERATION, OBSESSION and HAS INCLUDED. Those with high scores for this factor are more likely to think that environmental problems in their location have been exaggerated by industrialized countries, that such problems should not be a priority, and that their research system has been aware of them for a long time. Respondents who score low on this factor express greater concern about environmental problems in their location and report that the research system does not take environmental issues into account as much as it should.

Clearly, this sentiment is oriented toward the values and principles imported to Third-World countries from industrialized countries. Our interpretation is that a significant segment of the research community believes LDCs should define their own standards in dealing with environmental conservation and not simply align their policies with prescriptions from developed countries. Such an ideological orientation has been termed "*tiers-mondisme*" in French, directly translated into English as "Third-Worldism." It refers to the critique of industrialized countries by Third-World countries.[xxviii] To emphasize the ideological implications of this factor, it is labeled *tiers-mondisme*.

Identification of two dimensions underlying the diversity of attitudes, and the creation of factor scores for each of them, facilitate a general test for the effects of sector and location.[xxix] Tables 4 and 5 exhibit the results of means difference tests, first for *tiers-mondisme*, then for New Environmentalism.[xxx] Results confirm the item analysis, showing sector differences are smaller than location differences for both factors.

Table 4 shows that the model for *tiers-mondisme* by sector is not significant (sector mean differences). University researchers have the lowest scores, followed by NGOs, while scientists at national research centers have the highest. By contrast, the range of location means (.68) is more than four times as large as the range of sector means (.16) and the GLM model for the location mean differences is statistically significant at the .001 level. The lowest scores were for Kenyans (-.31), followed by Ghanaians (-.14). Keralan respondents score significantly higher on *tiers-mondisme* (.37) than their colleagues in Ghana or Kenya. This confirms the findings of the analysis of individual items, where Kenyans were found to be significantly less likely than Keralans to agree that environmental problems in developing countries have been exaggerated, that they are a rich-country obsession, or that their research system has included environmental costs for a long time.

The two-way analysis in Table 4 adds the interaction of sector and location to the main effects examined in the one-way analysis. The two-way model is highly significant and reveals an interaction between the two independent variables. Thus, we included a one-way model with sector as the independent variable, for each location. These show that sector matters for Kenyan attitudes, and to a lesser extent for Keralans, but not for Ghanaians. Kenyan academic scientists score notably lower than those in NRCs and NGOs, lower than any other group in Table 4. On the other hand, NGO researchers in Kenya scored an average of 0.059--higher than any other group of NGO respondents. For Kerala, the model is significant at the .10 level, but sector differences are not large enough to distinguish groups. The influence of organizational type is not as strong in Kerala as in Kenya.[xxxi]

The results for New Environmentalism are shown in Table 5. The one-way models by

16

sector or location are not significant. The two-way analysis, however, shows that the model including both sector and location is significant at the .10 level. Although each individual variable is not significant, the interaction between them offers some predictive value. Sector has a significant effect in Kenya and Kerala, matching the findings for *tiers-mondisme*, but sectoral differences are not significant.

These models indicate that sector and location do matter for individual attitudes toward environmental issues. The question remains whether these effects hold when controlling for other factors. A series of regression models was estimated for each factor. The first model (Model 1) includes only the dummy variables for location and sector.[xxxii] The second model (Model 2) adds control variables measuring cosmopolitan orientation (productivity on the international scene, number of professional ties with individuals in developed countries, number of years spent in developed countries) and organizational tenure (number of years the respondent has been worked for organization). The final model (Model 3) adds interaction terms between sector and location and between sector and tenure to Model 2. The results of these models for the two factors are presented in Tables 6 and 7.[xxxiii]

The three successive models for *tiers-mondisme*, reported in Table 6, are all statistically significant. The addition of each new set of variables improved the amount of variance explained by the model, such that 28% of the variance in *tiers-mondisme* is explained in Model 3. High scores on *tiers-mondisme* indicate a distinctively Third World perspective toward the environment, while low scores indicate greater adherence to developed country views. *Tiers-mondisme* is highest among scientists in national research centers, particularly in Kerala. These effects hold even while controlling for other factors. The negative coefficients for Ghana and

17

Kenya in Model 3 indicate that African scientists are less likely to report *tiers-mondiste* views than scientists in Kerala. The positive coefficient for NRC scientists is one of the strongest in the model. Working for a state research institute increases the likelihood of *tiers-mondiste* attitudes.

Two of the three indicators of cosmopolitanism are statistically significant: the amount of time spent in developed countries and the number of articles published in foreign journals. The number of professional ties in developed countries was not significant. Publication in foreign journals increases the international visibility of a researcher and is associated with a greater adherence to global ideas on environment protection, rather than a position centered around the more local geographical and organizational environment. Greater exposure to the influence of industrialized countries, which generally occurs through education abroad, produces the same result. Conversely, researchers who do not publish in foreign journals and have spent little time abroad--that is, who are more centered on their local environment--are more likely to report *tiers-mondiste* attitudes than more cosmopolitan researchers. Organizational tenure also reveals a statistically significant impact. The longer the respondent had been working in the organization at the time of the interview, the higher the score on *tiers-mondisme* in Model 3.

Model 3 also indicates significant interactions involving sector. The negative coefficient for the interaction of Tenure and NRC indicates that for researchers in state institutes, greater experience slightly reduces *tiers-mondisme*. Thus, seniority affects attitudes toward environmental issues, but not in the same way in all sectors. While experience in universities and NGOs tends to increase *tiers-mondiste* views among researchers, those in state institutes moderate the views they already hold.

Two significant interactions involve NGO respondents. Indeed, it is only these interaction terms that offer any evidence for the distinctiveness of the NGO context. The strongest effect is for NGO researchers in Kenya. The standardized coefficient of .31 indicates an increased likelihood of holding *tiers-mondiste* views, relative to the effects expected based on sector and location alone. Put differently, while Kenyans (and, to a lesser extent, NGO researchers) are less likely to adopt the view that LDCs should define their own standards, distinct from those of industrial countries, NGO researchers in Kenya have significantly more *tiers-mondiste* attitudes than other Kenyan researchers, or NGOs in Ghana and Kerala. Similarly, the interaction of NGO status and organizational tenure indicates that NGO researchers are more likely to adopt *tiers-mondiste* attitudes, the longer they are with their organization.

The results of the three regression models for New Environmentalism presented in Table 7 are far from conclusive, reflecting the low level of significance for location and sector obtained with the general linear models. Model 1 shows that working in NRCs decreased the score on New Environmentalism, but this effect disappears when controlling for cosmopolitan orientation and tenure, and with the addition of the interaction effects. As the interactions in Model 3 are not significant, Model 2 must be preferred overall. None of the variables in this model had a significant effect. Moreover, the r-square of 0.00 signals that the model does not explain any of the variance in the scores for New Environmentalism.

Discussion

In the following section the principal findings are summarized before considering the

implications of *tiers-mondisme*, cosmopolitanism, and the role of context in shaping environmental attitudes.

(1) The diversity of attitudes could be accounted for by two principal dimensions, expressing the new environmental paradigm and *tiers-mondisme*. *Tiers-mondisme* expresses a distinctive developing country perspective on environmental issues.

(2) The effect of sector is mediated by other factors. Kenyan NGO respondents report greater *tiers-mondisme*, but otherwise NGO researchers are not distinctive in terms of their attitudes.

(3) Location matters for researchers' attitudes. Researchers in the most developed location exhibit higher levels of *tiers-mondisme*. In fact, individuals in the most traditional research context (academics) in the most developed location report the highest levels of *tiers-mondisme* in the study.

(4) Cosmopolitanism--the strength of one's participation in the international system--reduces *tiers-mondisme*.

(5) Organizational tenure is related to *tiers-mondiste* attitudes, and the effect varies by sector. Over time NGO researchers become more *tiers-mondiste*, while state researchers become less so, than university researchers.

Our low success in predicting New Environmentalism has a straightforward interpretation: environmental concerns are now generally prevalent among researchers in the field of agriculture and environmental science in the locations studied. Hence, sectoral differences are mostly negligible, both when examining scientists' support of the concept of sustainability, and the level of attention that research institutions now pay to environmental matters. The hypothesis that NGOs *per se* recruit professionals who are more sensitive to the issue of environmental sustainability is not supported. Neither can it be argued that those who obtain employment in NGOs come to hold environmentalist attitudes. NGO researchers are largely similar in this respect to those in more traditional research contexts.

The finding that environmental attitudes are located on two underlying dimensions is

important for understanding why scientists in LDCs often experience the research agenda of potential donors as a mixed blessing. Since *tiers-mondisme* and New Environmentalism are not correlated, one may not categorize individuals as "environmentalists" pure and simple. "Anti"-environmentalists in the developing world are less likely to favor measures to limit environmental damage because they do not view environmental degradation as a problem. As we have seen, this is decidedly a minority viewpoint in our survey. Conversely, "environmentalists" believe that various forms of pollution are problematic and view agricultural productivity accordingly.

The existence of *tiers-mondiste* perspectives complicates the story. *Tiers-mondiste* scientists view environmental problems in LDCs as exaggerated and their solutions often unaffordable. Further, they believe that environmental issues *have already been* part of the research agenda of developing countries for many years. Some, for instance, view agronomic research on the timing of fertilizer application as inherently targeted toward the decreased use of fertilizers and reduction of potential environmental damage. The findings here suggest that many LDC researchers are strongly environmentalist, but simultaneously believe that the developing world has recognized these concerns and should adopt its own priorities and plans for implementation.

If this is true, it may be more important to determine the factors related to *tiers-mondisme* than a "New" environmentalism which is fast becoming conventional. Since the concept of sustainability is now widely accepted, arguments over research priorities center on how to achieve sustainable agricultural development and natural resource management in the local context. This was apparent in the lower degree of consensus among respondents on the

importance of environmental problems and on the need to protect natural resources to the detriment of agricultural production. For agricultural and environmental scientists, national context influences and interacts with organizational context.

Specifically, Keralan scientists are more likely than their African counterparts to view environmental issues as exaggerated by industrialized countries and believe that their research system has taken these issues into account. In this respect they are more *tiers-mondiste*. Of course, Kerala ranks highest among the three locations in terms of social and economic development, as well as the sophistication of the research system itself. Attitudes there may reflect greater involvement of the Keralan government in environmental and agricultural research, and also more confidence that the state can address these problems without following industrialized countries' prescriptions.[xxxiv]

The nature of *tiers-mondisme* may be illustrated by contrasting the groups representing the most extreme views, both of which are in the academic sector. The most *tiers-mondiste* group is Keralan university scientists. These individuals are not likely to have been educated abroad, owing to the development of the Indian university system and the opportunity to obtain higher degrees within the country. They are also unlikely to have spent much time abroad, and much of their time is taken up with teaching duties. They believe strongly in environmental values, but also believe it is part of their heritage to honor and preserve nature: the current environmental agenda is a Western rediscovery or fad. Kenyan academics, on the other hand are the least *tiers-mondiste* group in our study. They are commonly educated in the West, particularly in the U.S. or U.K., are well aware of donor priorities, and operating in a resource-poor system, are more likely to accept Western diagnoses of environmental problems.

An important influence evident in these results is cosmopolitanism, an orientation toward the international scientific community. Those who have been educated in the developed world and publish in international journals are less likely to adopt *tiers-mondiste* attitudes and more likely to view environmental problems through Western eyes. This suggests one respect in which the international research community has a homogenizing effect on the attitudes of scientists, supporting Scott and Meyer's view that as Western values diffuse to become global standards, scientists tend to conform to professional norms defined more by common training than organizational context.[xxxv]

A second influence involves organizational experience, measured here as years spent with the organization. In general, as the length of tenure increases, researchers exhibit greater *tiers-mondisme*. That is, seniority promotes decreased commitment to environmentalism as defined by developed countries. It might be, as we argued earlier, that senior researchers have had the opportunity to witness the failure of previous approaches and are skeptical about this new environmental agenda as well. This effect is strongest for NGOs, where years of experience are increasingly associated with *tiers-mondiste* views.

The differences induced by location may not only reflect differences in the national level of development, but also cultural differences. Redclift distinguishes three dimensions of the concept of sustainability (economic, political and epistemological) to explain why different communities and institutions take different and sometimes contradictory actions while claiming the mantle of sustainability.[xxxvi] He argues that different groups within LDCs utilize alternative epistemologies that may not agree with Western perspectives on sustainable development. Grassroots movements, NGOs, and many local scientists are aware of the existence of such

alternative views. Their perspectives on what constitutes sustainable agricultural development

and how to achieve it will be influenced by international, national, and local contexts.

For Ghanaian researchers, the analysis did not reveal differences between NGOs,

academic, and state research contexts. This suggests that below a certain level of development,

sectoral differences do not emerge. Researchers acquire positions regardless of the match

between their personal views and their organization ideological stand when there are few

positions available. Different types of organizations may not express strong ideological

commitments, given their needs to remain pragmatic in the use of scarce resources.

The specific nature of research in NGOs may also offer an explanation for the attitudes of

researchers in this sector. Contrary to traditional research organizations that are removed from

the economic reality of rural life, NGO staff may conduct research that is more applied, more

oriented toward small-scale, local improvements in technology, maintaining closer contact with

rural communities. They may feel strongly about environmental issues, but are faced with the

necessity of helping to solve immediate problems, using techniques that they would not approve

of from a strictly environmentalist perspective. In terms of environmental preservation,

sustainability commands that we leave some resources untouched, but in terms of social

sustainability and poverty alleviation, these resources may be essential for the survival of local

communities. Here, social and environmental aspects of sustainability are in conflict. Proximity

to local problems may affect the views of NGOs more than global ideologies.

The results here suggest that more attention, both theoretical and practical, be paid to the

relationships between *tiers-mondiste* attitudes, organizational context, and cosmopolitanism.

They support the notion of tradeoffs between ties to developed countries and orientation to local

problems. If NGOs socialize their staff to become more sensitive to local issues and detach

themselves from the influence of Western standards, then the implications of a high turnover of

professionals must be taken into account. Newcomers may be more responsive to donor

concerns, while their more experienced colleagues may be more open to the beneficiaries' needs.

Individuals may support different programs along those lines, causing conflict within the

organization. Changes in hierarchy sometimes bring NGOs to the point of destruction, and

ideological divergences are often blamed.

The same effect may follow from recruitment of staff who has spent time in developed

countries for educational purposes, or in other professional capacities. Such individuals are

generally considered an asset because of their external contacts and may help an NGO gain

legitimacy in the eyes of the state or donor agencies. However, they may also be more

supportive of global standards for environmental protection, and less responsive to the local

context. Our findings suggest that such factors should be taken into consideration.

As far as the process of knowledge generation is concerned, the local political and

cultural context in which organizations operate needs to be examined further to fully understand

the factors influencing individual attitudes. The level of democratization may explain the choice

of an organizational type. In more democratic countries, it may be more acceptable for a

researcher with strong opinions to work for an NGO and voice his/her opinions openly. The

policy orientations of the state also have an influence, so that where the state invests more in

agricultural and environmental research, the public sector becomes more attractive than the NGO

sector.

Development projects can only be successful with the participation and support of local

institutions, including those that participate in the process of generating knowledge, a process

that increasingly involves *both* international and local components. Understanding the

organizational context of research is one important step in this direction.

Table 1: Frequency Distribution of Attitudes toward the Environment by Sector (% Agree strongly)

ITEM	SECTOR			% AGREE STRONGLY
	NGO	University	NRC	
* Keep future generations in mind when designing agricultural research (FUTURE)	97.44	92.41	96.62	95.49
* Include environmental costs in measures of agricultural productivity (MEASURE COST)	87.18	85.71	86.99	86.64
* Resource conservation is important (CONSERVATION)	82.05	85.90	89.58	87.36
* Level of international agencies spending on environmental research (SPENDING)[a]	80.65	77.59	71.54	74.43
* Some natural resources should never be touched (NEVER TOUCH)	44.74	63.51	59.03	58.20*
* Spending on commodity vs. environmental research are often in conflict (CONFLICT)[b]	40.63	32.12	36.92	34.62
* Soil erosion is a big problem (EROSION)	79.49	74.67	72.41	74.13
* It is important to conserve land and water for agriculture (LAND&WATER)	66.67	54.05	57.04	57.65
* Water pollution is a big problem (WATER POLLUTION)	39.47	44.74	37.41	39.85
* Industrial pollution is a big problem (INDUSTRIAL POLLUTION)	29.73	24.83	34.62	28.46
* Increase productivity in favorable rather than marginal regions (CONCENTRATE)	24.32	44.16	42.07	40.15
* Environmental Problems are exaggerated by industrial countries (EXAGGERATION)[b]	26.32	18.92	12.50	16.41
* Environmental issues are a rich-country obsession (OBSESSION)[b]	10.26	6.58	8.45	8.17
* Research system has included environmental costs for long time (HAS INCLUDED)[b]	5.56	7.91	5.63	6.91

Levels of significance (chi-square): * p<.05

[a]: Percent "too little"

[b]: For this item, "Agree strongly" indicates an attitude unfavorable to environmental conservation

Table 2: Frequency Distribution of Attitudes toward the Environment by Location (% Agree strongly)

ITEM	LOCATION			% AGREE STRONGLY
	Kenya	Kerala	Ghana	
* Keep future generations in mind when designing agricultural research (FUTURE)	98.70	94.85	93.48	95.49
* Include environmental costs in measures of agricultural productivity (MEASURE COST)	88.00	80.00	92.39	86.64* [c]
* Resource conservation is important (CONSERVATION)	85.14	91.58	84.78	87.36
* Level of international agencies spending on environmental research (SPENDING)[a]	81.54	61.02	81.82	74.43** [c]
* Some natural resources should never be touched (NEVER TOUCH)	61.33	62.77	50.57	58.20*** [d]
* Spending on commodity vs. environmental research are often in conflict (CONFLICT)[b]	46.48	35.23	22.67	34.62*** [d]
* Soil erosion is a big problem (EROSION)	82.89	70.21	70.79	74.13* [c]
* It is important to conserve land and water for agriculture (LAND&WATER)	60.53	70.00	42.70	57.65*** [c]
* Water pollution is a big problem (WATER POLLUTION)	42.86	38.95	38.20	39.85
* Industrial pollution is a big problem (INDUSTRIAL POLLUTION)	34.67	26.04	25.84	28.46
* Increase productivity in favorable rather than marginal regions (CONCENTRATE)	21.62	62.11	32.22	40.15*** [d]
* Environmental problems are exaggerated by industrial countries (EXAGGERATION)[b]	4.00	25.27	17.78	16.41** [d]
* Environmental issues are a rich-country obsession (OBSESSION)[b]	4.00	10.99	8.79	8.17** [d]
* Research system has included environmental costs for long time (HAS INCLUDED)[b]	5.63	12.36	2.33	6.91*** [d]

Levels of significance: * p<.05, ** p<.01, *** p<.001.
[a]: Percent "too little"
[b]: For this item, "Agree strongly" indicates an attitude unfavorable to environmental conservation
[c]: Fisher's exact test
[d]: Chi-square

Table 3: Statements and Corresponding Factor Loadings from the Rotated Factor Pattern Matrix and Factor Structure Matrix (no decimals shown)[a] (N = 218)

STATEMENT	FACTOR PATTERN		FACTOR STRUCTURE	
	FACTOR 1	FACTOR 2	FACTOR 1	FACTOR 2
WATER POLLUTION	12	56*	15	57
INDUSTRIAL POLLUTION	7	47*	10	48
CONCENTRATE	-27	37*	-25	35
EXAGGERATION	41*	5	40	7
OBSESSION	44*	-9	45	-6
HAS INCLUDED	50*	7	49	9
NEVER TOUCH	-13	17	-10	17
CONSERVATION	-5	4	-2	5
MEASURE COST	7	-2	11	1
LAND&WATER	-31	3	-28	3
EROSION	19	12	22	14
PROPORTION OF VARIANCE EXPLAINED	0.60	0.52		

[a]: The original coefficients have been limited to two decimal places and multiplied by 100.
*: Factor loading greater than 35

Table 4: General Linear Model and Means Difference Test of Respondents' Average Score on Tiers-Mondisme, by Sector and Location (N=211)[a]

SECTOR	LOCATION			SECTOR MEAN
	Kenya	Ghana	Kerala	
NGO	0.059	-0.056	-0.038	-0.029
National	-0.188	-0.123	0.437	0.056
University	-0.796 [c]	-0.233	0.444	-0.100
LOCATION MEAN*** [b]	-0.307*	-0.139	0.371+	0.000****

Levels of significance (F test): + $p<.10$, * $p<.05$, ** $p<.01$, *** $p<.001$, **** $p<.0001$.
[a]: Levels of significance reported after a column or row headings indicate the significance of a one-way model, i.e. a main effect of location or sector. Those reported after a figure (mean) indicate the significance of a one-way model run by location, after the two-way model revealed a significant interaction between the two independent variables. The two-way model is significant at the .0001 level.
[b]: Main effect of location: Keralans have significantly higher scores (Tukey's test, $\alpha = .05$)
[c]: Interaction effect in the models run for each location individually: In Kenya, university respondents have significantly lower scores than respondents in other sectors (Tukey's test, $\alpha = .05$)

Table 5: General Linear Model and Means Difference Test of Respondents' Average Score on New Environmentalism, by Sector and Location (N=211)[a]

SECTOR	LOCATION			SECTOR MEAN
	Kenya	Ghana	Kerala	
NGO	0.384	-0.108	-0.195	-0.047
National	-0.199	0.017	0.002	-0.059
University	0.257	-0.110	0.317	0.148
LOCATION MEAN	-0.032*	-0.045	0.068+	0.000+

Levels of significance (F test): + $p<.10$, * $p<.05$.

[a]: Levels of significance reported after a column or row headings indicate the significance of a one-way model, i.e. a main effect of location or sector. Those reported after a figure (mean) indicate the significance of a one-way model run by location, after the two-way model revealed a significant interaction between the two independent variables. The two-way model is significant at the .10 level.

Table 6: OLS Regression Coefficients for Tiers-Mondisme Regressed on Sector, Location, Cosmopolitan Orientation, and Tenure

VARIABLE	MODEL 1		MODEL 2		MODEL 3	
	b	β	b	β	b	β
Intercept	0.25**		0.31**		0.16**	
Sector						
NGO	0.09	0.05	-0.02	-0.01	-0.49	-0.24
NRC	0.20*	0.14	0.09	0.07	0.47*	0.33
University (Reference)						
Location						
Ghana	-0.51**	-0.35	-0.48**	-0.33	-0.48**	-0.33
Kenya	-0.70**	-0.44	-0.59**	-0.37	-0.85**	-0.54
Kerala (Reference)						
Cosmopolitan Orientation						
Number of Articles in Foreign Journals			-0.05**	-0.21	-0.05**	-0.20
Number of Years Spent in DCs			-0.03	-0.14	-0.03**	-0.15
Number of Professional Contacts in DCs			0.02	0.04	0.02	0.05
Number of Years in the Organization (Tenure)			0.01	0.08	0.03**	0.05
Interactions						
NGO*Ghana					0.05	0.02
NGO*Kenya					1.28**	0.31
NRC*Ghana					-0.06	-0.03
NRC*Kenya					0.18	0.09
NGO*Tenure					0.07*	0.21
NRC*Tenure					-0.03**	-0.37
Adjusted R^2	0.17		0.22		0.28	
N	211		194		194	
F-Statistic	11.522***		6.994***		5.79***	

* $p<.10$ ** $p<.05$ *** $p<.001$.

Table 7: OLS Regression Coefficients for New Environmentalism Regressed on Sector, Location, Cosmopolitan Orientation, and Tenure

VARIABLE	MODEL 1		MODEL 2		MODEL 3	
	b	β	b	β	b	β
Intercept	-0.20*		0.14		0.27	
Sector						
NGO	-0.18	-0.09	-0.20	-0.10	-0.51*	-0.26
NRC	-0.20*	-0.14	-0.13	-0.09	-0.25	-0.18
University (Reference)						
Location						
Ghana	-0.11	0.07	-0.15	-0.11	-0.40*	-0.28
Kenya	-0.08	0.05	-0.11	-0.07	-0.06	-0.04
Kerala (Reference)						
Cosmopolitan Orientation						
Number of Articles in Foreign Journals			0.02	0.07	0.01	0.06
Number of Years Spent in DCs			0.02	0.08	0.01	0.04
Number of Professional Contacts in DCs			-0.03	-0.06	-0.02	-0.04
Number of Years in the Organization (Tenure)			-0.00	-0.01	-0.00	-0.03
Interactions						
NGO*Ghana					0.51	0.11
NGO*Kenya					0.53	0.16
NRC*Ghana					0.40	0.23
NRC*Kenya					-0.12	-0.13
NGO*Tenure					-0.06	-0.19
NRC*Tenure					0.00	0.07
Adjusted R^2	0.00		0.00		0.02	
N	211		194		194	
F-Statistic	1.112		0.781		1.282	

* $p<.10$ ** $p<.05$.

LIST OF ATTITUDINAL QUESTIONS
ON ENVIRONMENTAL PROTECTION

Question: Now I'm going to read some statements. I'd like to know whether you "Agree strongly", "Agree somewhat", Disagree somewhat", or "Disagree strongly".

1=Agree strongly   2=Agree somewhat   3=Disagree somewhat   4=Disagree strongly
9=Don't Know or No Response

EXAGGERATION	Environmental problems in the Third World have been exaggerated by industrial countries and donor agencies.
OBSESSION	Environmental issues are a rich-country obsession that Kenya/Kerala/Ghana cannot afford.
HAS INCLUDED	The research system in Kenya/Kerala/Ghana has considered the environmental costs of production for many years.
WATER POLLUTION	Water pollution is a big problem in Kenya/Kerala/ Ghana.
INDUSTRIAL POLLUTION	Industrial pollution is a big problem in Kenya/Kerala/Ghana.
CONCENTRATE	Agricultural research should concentrate more on increasing productivity in favorable than in marginal regions.
FUTURE	Even with the problems facing Kenya/Kerala/Ghana today, agricultural research must be designed with future generations in mind.
EROSION	Soil erosion is a big problem in Kenya/Kerala/Ghana.
NEVER TOUCH	There are some natural resources in Kenya/Kerala/Ghana that should not be touched no matter what the short term benefits.
CONSERVATION	Resource conservation is important even if it does not lead to immediate gains in productivity.
MEASURE COST	The measurement of productivity in agriculture should include environmental costs.
LAND & WATER	The most important factor for production in Kenya/Kerala/Ghana is the conservation of land and water.

SPENDING   Do you think that spending by international agencies on environmental research is too much, too little, or about right? (*coding: 1=Too much 2=Too little   3=About right   9*)

CONFLICT   Spending on commodity research and spending on environmental research are often in conflict.

APPENDIX B
CORRELATION MATRIX
(SPEARMAN CORRELATION COEFFICIENT)
FOR ALL ITEMS USED IN THE ANALYSIS

VARIABLE	FUT.	MEAS. COST	CONSERV.	SPEND.	NEVER TOUCH	CONFLICT	EROSION	LAND & WATER	WATER POLL.	INDUST. POLL..	CCENT.	EXAG.	OBSESS	HAS INCLUDED
FUTURE	1.00													
MEASURE COST	0.13*	1.00												
CONSERVATION	0.19*	0.27*	1.00											
SPENDING	0.01	0.10	-0.07	1.00										
NEVER TOUCH	0.04	0.13*	0.11+	0.12+	1.00									
CONFLICT	0.01	0.12+	0.08	0.07	0.09	1.00								
EROSION	0.08	0.21*	0.05	-0.03	0.14*	0.16*	1.00							
LAND & WATER	0.17*	0.08	0.06	-0.01	0.06	0.19*	0.01	1.00						
WATER POLLUTION	0.05	0.12+	0.02	0.02	0.09	0.05	0.09	0.06	1.00					
INDUSTRIAL POLLUTION	-0.01	-0.01	0.01	-0.09	0.06	0.03	0.14*	0.03	0.34*	1.00				
CONCENTRATE	-0.03	-0.04	-0.00	-0.12+	0.07	-0.01	-0.08	0.06	0.22*	0.11+	1.00			
EXAGGERATION	0.08	-0.05	0.01	0.05	-0.03	0.10	-0.07	0.12+	-0.07	-0.14*	0.05	1.00		
OBSESSION	-0.06	-0.25*	-0.05	0.21*	0.01	0.03	-0.16*	0.04	-0.02	-0.09	0.21*	0.26*	1.00	
HAS INCLUDED	0.01	-0.06	-0.00	0.13*	-0.00	-0.06	-0.14*	0.18*	-0.15*	0.07	0.13*	0.18*	0.18*	1.00

Levels of Significance: + p<.10, * p<.05.

NUMBER OF RESPONDENTS PER CATEGORY

Location Sector	Kenya	Ghana	Kerala	Total
University	14	21	23	58
National Research Center	39	38	43	120
NGO	6	16	11	33
Total	59	75	77	211

Notes

i. World Commission on Environment and Development, *Our Common Future* (Oxford: Oxford University Press, 1987), p. 8.

ii. Francis O. Adeola, "Cross-National Environmentalism Differentials: Empirical Evidence from Core and Noncore Nations," *Society and Natural Resources* 11 (June 1998): 339-364. What is notable in the present context is that Adeola finds that citizens of noncore nations actually demonstrate a higher degree of environmental awareness and are more concerned about the environment than citizens of core nations.

iii. The scientific research of private corporations will not be considered here. Usually, it is designed to fulfill corporate goals that are independent of the social context of the location where research is conducted, and the results are not necessarily meant for public access.

iv. Paul J. DiMaggio and Walter W. Powell, "The Iron Cage Revisited: Institutional Isomorphism and Collective Rationality in Organizational Fields," in *The New Institutionalism in Organizational Analysis,* eds. Walter W. Powell and Paul J. DiMaggio. (Chicago: The University of Chicago Press, 1991).

v. Anthony Bebbington and John Farrington, "Governments, NGOs and Agricultural Development: Perspectives on Changing Inter-Organizational Relationships," *Journal of Development Studies* 29 (January 1993): 199-219; Bishwapriya Sanyal, *Comparative Autonomy: The Dialectic of State-NGOs Relationship in Developing Countries*, Research Series No. 100 (Geneva, Switzerland: International Institute for Labor Studies, 1994).

vi. Michael Edwards and David Hulme, "Introduction," in *Making a Difference: NGOs and Development in a Changing World*, eds. Michael Edwards and David Hulme (London, England: Earthscan, 1992); Roger C. Riddell and Mark Robinson, *Non-Governmental Organizations and Rural Poverty Alleviation* (Oxford: Clarendon Press, 1995).

vii. Thomas F Carroll, *Intermediary NGOs* (West Hartford, CT: Kumarian Press, 1992); David Korten, *Getting to the Twenty-First Century: Voluntary Action and the Global Agenda* (West Hartford, CT: Kumarian Press, 1990).

viii. John Farrington and Anthony Bebbington, with Kate Wellard, and David J. Lewis, *Reluctant Partners? Non-Governmental Organizations, the State and Sustainable Agricultural Development*. (New York: Routledge, 1993); Thomas F Carroll, *Intermediary NGOs* (West Hartford, CT: Kumarian Press, 1992).

ix. Carrie A. Meyer, "The Political Economy of NGO and Information Sharing," *World Development* 25 (August 1997): 1127-1140.

x. Sheila Jasanoff, "NGOs and the Environment: From Knowledge to Action," *Third World Quarterly* 18 (September 1997): 579-94.

xi. Farrington and Bebbington, *Reluctant Partners?*

xii. Some NGOs are, of course, opportunistic, with no particular perspective on development. These seek to take advantage of available funding to create jobs for needy professionals in the developing world (See David Hulme, "Social Development Research and the Third Sector: NGOs as Users and Subjects of Social Inquiry," in *Rethinking Social Development*, ed. David Booth. (Essex, England: Longman Scientific and Technical, 1994); David Kaimovitz, "The Role of Nongovernmental Organizations in Agricultural Research and Technology Transfer in Latin America," *World Development* 21 (August 1993): 1139-1150; Gautam N. Yadama, "Tales from the Field: Observations on the Impact of Nongovernmental Organizations," *International Social Work* 40 (1997): 145-162.). Those we are concerned with here carry a vision of development that they try to apply in the field. They represent a large number of NGOs (See Hubert Campfens, "Partnerships in International Social Development: Evolution in Practice and Concept," *International Social Work* 39 (April 1996): 201-23; Bebbington and Farrington, *Reluctant Partners?*; Mary Price, "Ecopolitics and Environmental Nongovernmental Organizations in Latin America," *Geographical Review* 84 (January 1994): 42-58.).

xiii. W. Richard Scott and John W. Meyer, eds., *Institutional Environments and Organizations: Structural Complexity and Individualism* (Thousand Oaks, CA: Sage, 1994).

xiv. John Boli and George M. Thomas, "World Culture in the World Polity: A Century of International Non-Governmental Organization," *American Sociological Review* 62 (April 1997): 171-90.

xv. John W. Meyer, John Boli, and George M. Thomas, "Ontology and Rationalization in the Western Cultural Account," in *Institutional Environments*, eds. W. Richard Scott and John W. Meyer.

xvi. Wesley Shrum and John Beggs, "Methodology for Studying Research Networks in the Developing World: Generating Information for Science and Technology Policy," *Knowledge and Policy* 9 (1997): 62-85.

xvii. Wesley Shrum, *Research Capacity for Sustainable Development. Report of a Field Study in Ghana, Kenya and Kerala (India)*, Publication No. 11 (The Hague, Netherlands: RAWOO, 1996).

xviii. This applies to both foreign and domestic publications for the sample in this study and for the nation as a whole using publication counts compiled from the Science Citation Index. See T.O. Eisemon and C.H. Davis, "Universities and Scientific Research Capacity," *Journal of Asian and African Studies* 27 (1992): 68-93.

xix. The trend began to reverse itself in the 1990s, largely through Ghana's implementation of the structural adjustment programs and an associated increase in donor interest.

xx. Not all items were used in the final analysis. First, some were too ambiguous to be easily interpreted. Second, a few questions generated more than 20% missing data, either because the respondent did not answer or because s/he had no opinion.

xxi. We used PROC GLM in SAS. GLM is more appropriate than a regular ANOVA when the categories of the independent variable have unequal numbers of cases. The Tukey Test for Honestly Significant Differences will be included in these models. In addition to the F-test in the ANOVA table, which basically signals the influence of the independent variable(s) on the dependent one, this test indicates which groups are significantly different from each other, examining them in pairs. It is more adequate than other tests when the groups have unequal numbers of subjects (See Larry Hatcher, *A Step-by-Step Approach to Using the SAS System for Factor Analysis and Strucutral Equation Modeling* (Cary, NC: SAS Institute Inc., 1994).).

xxii. We also employed a large number of other control variables from the data set, but these are the factors that proved important for the analysis.

xxiii. Scott and Meyer, *Institutional Environments and Organizations*.

xxiv. Given the way the items were phrased, this category indicates the respondents most concerned with environmental protection for the following items: FUTURE, EROSION, WATER POLLUTION, NEVER TOUCH, CONSERVATION, MEASURE COST, LAND&WATER, CONCENTRATE and INDUSTRIAL POLLUTION. For the other items, "Agree strongly" indicates the attitude least favorable to environmental protection.

xxv. The third factor consisted of only one variable and was not used for further analysis, since factors of fewer than three variables are generally considered less reliable.

xxvi. The factor pattern shows the unique contribution that each item makes to each factor, and the structure matrix shows how the items and the factors are related, regardless of the contribution of each item.

xxvii. This position is interpretable as follows: if pollution is viewed as a problem, applying intensive production techniques on fragile ecosystems, or encouraging farmers to use marginal areas for agricultural production, will increase the damage to the environment. In this view, it is more efficient for the economy to increase production in regions that are naturally more fertile, and to leave marginal regions in a state of low utilization.

xxviii. Gilbert Rist, *Le Développement, Histoire d'une Croyance Occidentale* (Paris, France: Presses de Science Po, 1997).

xxix. The factor scores in SAS result from the multiplication of the standardized data vector and the standardized scoring coefficient, for each observation. They have a mean of 0 and a standard deviation of 1. The standardized scoring coefficients are standardized regression coefficients computed from correlation matrices. They predict each factor from the variables.

xxx. Mean differences were calculated based on a first estimating a General Linear Model (similar to ANOVA), using Tukey's test for Honestly Significant Differences.

xxxi. The Tukey test is used as the criterion here. Sectoral means in Kerala, while not significantly different, are actually the opposite of Kenya. NGO scientists scored lowest, while university respondents scored the highest. The order in Ghana is the same as in Kenya, but sectoral differences are not significant.

xxxii. Kerala is used as the reference category for location. Universities are the reference category for sector.

xxxiii. Indicators of multicollinearity showed that tolerance levels did not fall under .4. Hence, multicollinearity is not a problem for the analysis.

xxxiv. Govindan Parayil, "The 'Kerala model' of Development: Development and Sustainability in the Third World," *Third World Quarterly* 17 (December 1996): 941-57.

xxxv. Scott and Meyer, *Institutional Environments and Organizations*.

xxxvi. See Michael Redclift, "Sustainable Development and Popular Participation: A Framework for Analysis," in *Grassroots Environmental Action - People's Participation in Sustainable Development*, eds. Dharam Ghai and Jessica M. Vivian (London: Routledge, 1992). In particular, he acknowledges the fact that "sustainable development is usually discussed without reference to epistemological issues. It is assumed that the system of acquiring knowledge in the North, through the application of scientific principles, is a universal epistemology" (p. 34).