

Zentrum für Entwicklungsforschung
Center for Development Research



Universität Bonn

ZEF Bonn

Annual Report 2001/2002



ZEF-Essay "Disasters, Conflicts and Natural Resource Degradation:
Multidisciplinary Perspectives on Complex Emergencies"



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Preface

This Annual Report of ZEF has been redesigned in accordance with the proposals made by the ZEF Advisory Board. We highlight a relevant development theme in an essay that may be debated further and followed up by ZEF, its collaborators and others. This year we have put forward the theme of “Disasters, Conflicts and Natural Resource Degradation: Multidisciplinary Perspectives on Complex Emergencies”.

The rest of the Annual Report is again structured along the lines of the “ZEF Strategy for the Future”, which was released last year. Progress in the crosscutting research themes, which allow for transdisciplinary integration, is reported on (theories of development and change, natural resource scarcity, poverty and equity, and governance and governability).

As usual, activities by the three departments are reported and the many different initiatives of ZEF researchers, partners and guests are documented.

One of the important highlights of 2001/02 was the external evaluation of ZEF by a high-level panel of experts. We are extremely pleased with the favourable assessment and the panel’s findings and conclusions, and we are following up with adjustments in the small number of areas where the panel suggested change. We include an English summary of the conclusions in this Annual Report.

Following the evaluation, the University of Bonn and the Land of North Rhine-Westphalia have signed an agreement that assures core funding of ZEF on a significant scale, ensuring the Center’s sustainable after 2004, when Federal Government pump-priming support ends.

This report demonstrates that ZEF has seen further growth, integration, and consolidation of research and teaching programs in 2001/2002. Also, new initiatives in global networking as well as its distance learning scheme have been launched. The research of ZEF’s doctoral students is more and more closely related to ZEF’s major research programs on crosscutting themes and has become an integral part of its overall research agenda. ZEF’s visiting professors and senior researchers are playing a key role in facilitating these developments.

Our sincerest thanks goes to all those who have contributed to making the past year a successful one, to our staff, their families and to ZEF’s international and German partners.

Joachim von Braun

Paul L.G. Vlek

Andreas Wimmer



ZEF board members and directors at their meeting in July 2002

ZEF's International Advisory Board

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Essay

"Disasters, Conflicts and Natural Resource Degradation: Multidisciplinary Perspectives on Complex Emergencies"

Joachim von Braun, Paul L.G. Vlek, Andreas Wimmer

The purpose of this essay is to highlight disasters in a broader sense as an important area of development research and policy. The disaster-related information base is weak, research is still in its early stages and current political responses are piecemeal. Our suggestion is to take a closer look at natural, economic and political factors responsible for major disasters to develop a basis for an integrated policy approach.

Some of the world's major disaster areas, such as in Afghanistan, Somalia or Ethiopia, are simultaneously the locus of protracted conflict and war, natural disasters and a long-term degradation of natural resources. War, famines, epidemic diseases and resource depletion seem to occur in the same locations, just like with the series of plagues in the scriptures.

Despite this apparent concurrence, the relation between political conflict, poverty and natural resource degradation in the causation of such complex emergencies is still hazy. While there are obvious feedback mechanisms, for example, between conflict, institutional breakdown, poverty, and vulnerability to hazards, the precise nature of these linkages remains to be determined. Interdisciplinary research is especially needed

- on the linkages between man-made and naturally caused complex disasters,
- on each of their causes and
- on effective ways of their mitigation and prevention.

On the policy-making side, too little attention is paid to improving the situation of the poor in conflicts and disasters: disaster prevention resources flow largely to where capital damage can be reduced, not to where poor peoples' livelihood can be sustained. While the politics of prevention, both of vulnerability to hazards and of violent conflict, are by now well established, we lack a solid comparative evaluation of the various approaches and their context-dependent efficiency. An integrated approach that addresses both short-term vulnerability to disasters and violent conflict and long-term policies for natural resource utilisation, poverty reduction and democratisation that prevent hazards has yet to be developed.

In the following, we first describe and discuss definitions, trends and changing patterns of man-made as well as natural disasters. Second, we highlight the interlinkages between long-term and creeping degradation of natural resources, especially soil, and natural disasters. Third, we discuss the relation between political conflicts and man-made disasters such as wars and famines. We are thus only addressing some of the linkages in an obviously far more complex causal pattern. Much needs

Interdisciplinary research is needed on the linkages between issues such as conflict, poverty and vulnerability to hazards.

to be done in order to understand the entire set of causal relationships at work in the production of disasters. The concluding section hints at some possible paths for future research.

1. Disasters: definitions, trends and patterns

1.1 Definitions

The onset speed of a disaster is an important factor in examining vulnerability trends. There are sudden-onset disasters, such as earthquakes, and slow-onset disasters, examples of the latter being epidemics or desertification.

Definitions of disasters range from the engineering-technical to the sociological perspectives (Plate, Merz Eikenberg. 1999). A distinction has traditionally been made between **natural** and **anthropogenic** disasters. Some classifications divide the latter into **technical disasters** (industrial disasters, such as the chemical accident in Bophal, India) and **violent (military) conflicts**. We will not discuss technical disasters in this essay.

Natural disasters result from natural hazards, i.e. threatening events that can be defined by magnitude and probability of occurrence. The notion of hazards thus implies both the frequency of occurrence of an event and the vulnerability to its consequences. The occurrence of an extreme natural event does not necessarily lead to disaster as it may not always affect people or economic assets. The onset speed of disaster is another relevant factor in investigating vulnerability trends. The distinction here is between **sudden-onset** and **slow-onset** disasters, examples of the latter being compounding events such as epidemics, droughts and/or creeping hazards such as desertification. The characteristics of sudden-onset disasters, such as

earthquakes or cyclones, are fast occurrence and a generally short warning period. Creeping disasters, caused by droughts, should be more predictable. The beginnings of creeping hazards can be difficult to determine, which complicates the recording of statistics and thus the analysis of trends.

Man-made disasters such as violent conflicts and wars result from complex interactions between political systems and different factors within such systems. Wars play different roles and various types of war are distinguished according to the severity of the conflict (usually taking death tolls as a measurement), the type of encounter (guerrilla warfare versus conventional warfare), and the political ends

pursued by the combatants: from nationalist unification and liberation wars to imperial expansion, post-colonial proxy wars and civil wars of the most varied kinds.

Both man-made and natural disasters can be divided by at least seven criteria, which likewise can give an indication of vulnerability: strength, frequency, duration, geographical expansion, speed of entry, spatial expansion and regularity. All of these



Environmental hazards by waste mountains, Philippines



characteristics can change in principle with the passage of time and thus signal an increase or a reduction in vulnerability. The following definition comes from the International Federation of the Red Cross and Half Moon (IFRC) and presents a compromise between analytical and operational approaches:

“Disasters combine two elements: events and vulnerable people. A disaster occurs when a disaster agent (the event) exposes the vulnerability of individuals and communities in such a way that their lives are directly threatened or sufficient harm has been done to their community’s economic and social structures to undermine their ability to survive. A disaster is fundamentally a socio-economic phenomenon. It is an extreme but not necessarily abnormal state of everyday life in which the continuity of community structures and processes temporarily fails. Social disruption may typify a disaster but not social disintegration.” (IFRC, 1993, pp. 12-13)

The following section elaborates on the concept of vulnerability central to this definition of disasters.

1.2 Concepts and determinants of vulnerability to hazards

The concept of vulnerability to hazards comprises a variety of components, allowing for different possible interpretations. In the case of man-made disasters such as wars, the political factors obviously stand at the centre of analysis, and human agency is made directly responsible for the disastrous loss of life through violence and famine. However, even with regard to natural disasters, recent research stresses the role of human agency in creating vulnerability to hazards. Disasters are no longer seen as the expression of bad luck; they result rather from the interaction of political, economic, social, technological and natural processes. Knowledge about these determining factors is necessary for a solid understanding of hazard vulnerability because the so-called external factors (e.g. the increased frequency of extreme events such as heavy storms) as well as social susceptibility may have changed.

A greater recognition of anthropogenic aspects could lead to a growing awareness of the problem and thus to a reduction of susceptibility to disasters through improved security measures and protection mechanisms. Corresponding changes have already taken place at the level of the dominant research paradigms. The first paradigm, the ‘hazard paradigm,’ focused on an external, destructive trigger. In the late 1970s and the beginning of the 1980s, a second paradigm emerged that abandoned the focus on events. Disasters were seen as consequences of social vulnerability. The third and most recent paradigm integrates these two earlier, opposing ones. Here, disasters are regarded as crises and as times of extreme uncertainty, as social situations. More and more disasters are seen as one form of crisis phenomenon among others (Blaikie et al., 1994; Gilbert, 1998).

The concept of vulnerability assumes a central role within this new paradigm. Vulnerability is not a static concept; it changes because of the activities of those affected (Webb and Harinarayan, 1999). According to this interpretation, vulnerability can be formalised as follows:

Recent research stresses human agency in creating vulnerability to hazards. Disasters are seen as the result of interaction between political, economic, social, technological and natural processes.

Vulnerability (V) = Hazard - Coping

with: Hazard = H (probability of the hazard or process; shock value; predictability; prevalence; intensity/strength) and

Coping = C (preparedness to deal with risks; possibilities for exchange; potentials for public and private transfers, incl. timeliness).

Physical proximity to a natural or man-made disaster increases hazard. Low social and economic status reduces coping capacity. It is estimated that people in low-income countries have a four-times higher chance of being killed by a natural disaster than people in high-income countries (IFRC, 1993).¹ And all but three of the most severe 25 wars (with death tolls above 0.5% of the population) occurred in the developing world.² Thirty-eight of the 67 major violent conflicts that occurred between 1960 and 1995 hit low-income countries (Stewart, Huang, and Wang 2001: 70). A fragile physical environment, unstable local economy and lack of state or private institutions also decrease coping capacities (Blaikie et al., 1994, pp. 21-26).

The role of institutions is especially important in understanding disasters (von Braun, Feldbrügge 1998). Formal and informal institutions are placed under great pressure by natural hazards and violent conflicts. Disasters affect institutions in various ways and sequences. The formal or official institutions usually fall first, enhancing the role of informal institutions. At the same time, new substitutes for failing institutions can appear ad hoc, e.g. the rise of community actions after the collapse of state institutions. External factors such as climate, physiography, production conditions and developmental-political measures influence the “assets” of households, which in turn affect risk-reducing and risk-distributing coping capacities (Feldbrügge, von Braun 2002).

The recognition that people are at least in part responsible for the origins of disasters introduces the possibility for an active reduction in vulnerability through a series of decisions and actions. The responsibility for disasters therefore moves to the organisational and systematic levels. Focusing on vulnerability also reveals why disasters occur more often in developing countries.

A disaster usually affects formal or official institutions first, enhancing the role of informal institutions. At the same time, substitutes can appear, such as community actions, which compensate for the collapsed state institutions.



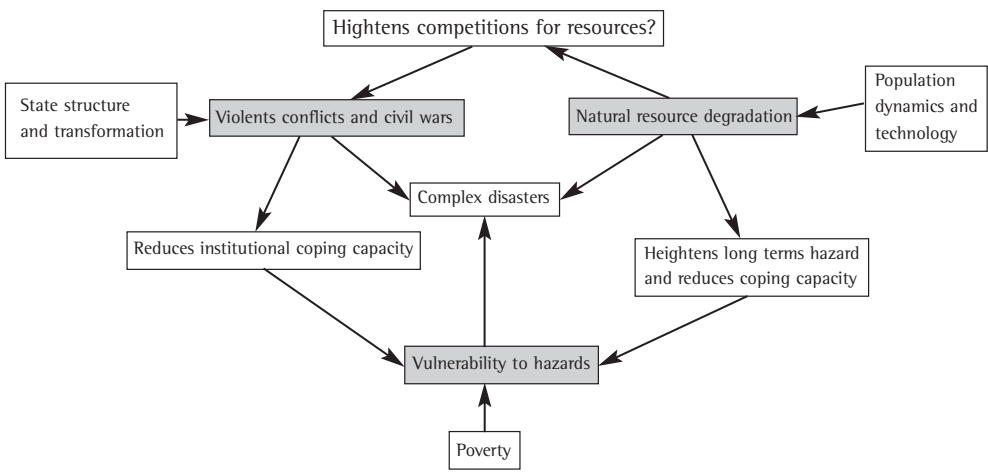
Bush fire damages in Ghana

¹ Notably, during the past four decades, all 40 disasters with the highest death tolls took place in developing countries, with the exception of an earthquake in Italy, which left 4,800 persons dead. The following disasters are the most significant to have occurred in developing countries during the last four decades (until 1995): Ethiopia (famine 1972: 600,000 dead); Bangladesh (cyclone 1970: 300,000 dead); Ethiopia (drought 1984: 300,000 dead); China (earthquake 1976: 242,000 dead); Ethiopia (drought 1974: 200,000 dead); Bangladesh (cyclone 1991: 139,000 dead); Ethiopia (drought 1973: 100,000 dead); Mozambique (drought 1985: 100,000 dead); Peru (earthquake 1970: 67,000 dead); Iran (earthquake 1990: 36,000 dead). This development may be caused by a growing number of natural hazards or by a lack of protection systems in developing countries.

² Between 1970 and 1995, the major wars were: Afghanistan (1,550,000 dead); Angola (750,000 dead); Bangladesh (1,000,000 dead); Bosnia (263,000); Burundi (280,000); Cambodia (1,221,000 dead); Croatia (25,000); Cyprus (5,000); El Salvador (75,000); Ethiopia (614,000); Guatemala (140,000); Iran (588,000); Iraq (between 400,000 and 600,000); Kuwait (200,000); Lebanon (163,000); Liberia (155,000); Mozambique (1,050,000); Nicaragua (80,000); Rwanda (502,000); Sierra Leone (30,000); Somalia (355,000); Sudan (1,500,000); Tajikistan (50,000); Uganda (611,000); Vietnam (estimated 1,000,000). Source: Stewart; Huang, and Wuang (2001:74).

Per capita income growth and social security systems appear to lead to improved technological and institutional security systems and make recovery from disasters easier. More powerful institutions prevent extreme events from becoming catastrophic. They are an important factor in reducing hazard vulnerability (BMZ 1997).

Adopting the distinction between hazard and coping capacity helps to rethink the causal mechanisms producing vulnerability to disasters. And it enables more light to be cast on the role that different ecological, economic and political factors may have on the production of complex disasters where war, famines and natural resource degradation interact. The following graph highlights some of these possible interactions and causal relationships, a number of which will be alluded to below, while others remain to be explored by future research. Before we discuss in more detail the mechanisms producing war-related disasters and leading to long-term resource degradation, we will have a look at recent trends in numbers and impact of disasters.



1.3 Trends in numbers of disasters

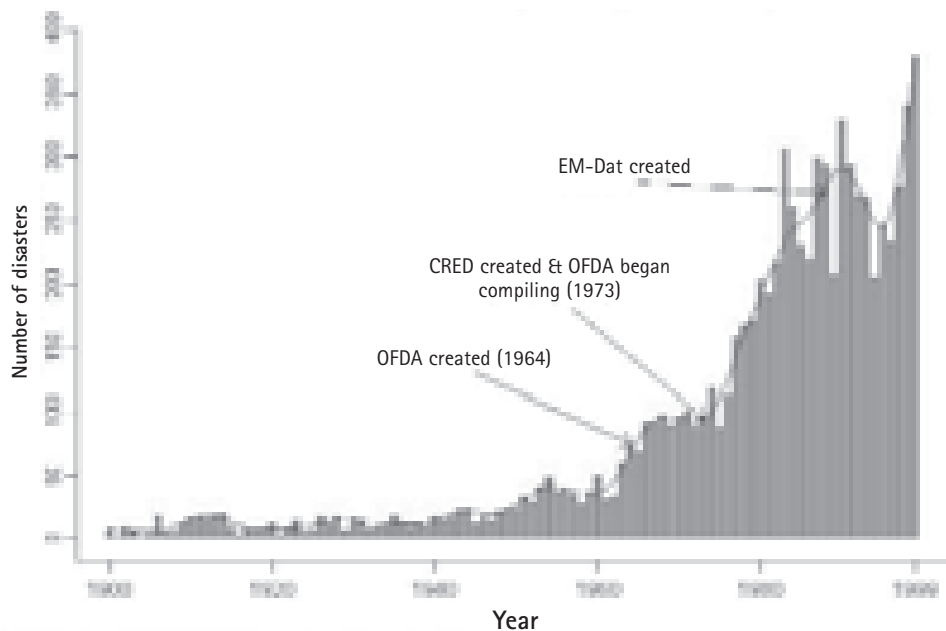
As can be gathered from the following two figures, there has been a considerable increase in the number of recorded natural disasters and wars especially in the second half of the 20th century. Figure 1 shows the number of disasters together with the years in which data collection improved as a result of the founding of institutions to study disasters. According to this data, there has been a slight increase in the number of disasters. Unfortunately, we are not able to determine how much of this trend is due to better reporting and data collection and how much results from an effective increase in number of disasters (CRED 1994).

With regard to wars (Figure 2), the pattern of change is less clear, especially when taking into account all types of war - from civil wars to large scale inter-state wars - simultaneously. The figure shows a wave-like oscillation around a mean value until the end of the 1950s and a rising trend since the 1960s, culminating in the 1980s. In later sections, we will refer to some hypotheses explaining this pattern. Obviously, the number of wars and natural disasters does not give a clear enough picture of the impact of these events - as the relatively small number of wars during the most disastrous years of World War II demonstrates. We may therefore also look at the loss of lives due to natural and man-made disasters as an indicator of vulnerability.

There has been a considerable increase in the number of recorded disasters and wars especially in the second half of the 20th century. However, the mere number of wars and disasters does not sufficiently represent their impact.

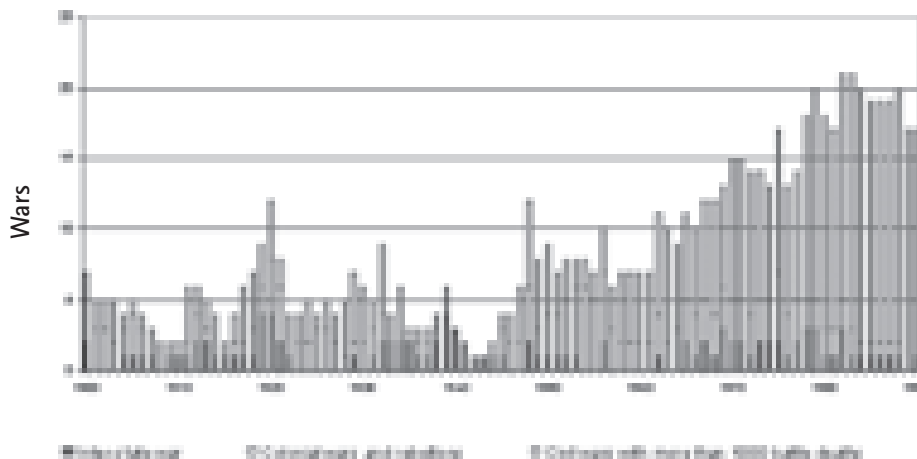


Figure 1: Number of natural disasters reported, 1900–1999



EM-DAT: The OFDA/CRED International Disaster Database (<http://www.cred.be>)
Source: Feldbrügge, von Braun (2002)

Figure 2: Number of wars with more than 1,000 battle deaths, 1900–1990



Source: Version 3.0, The Correlates of War Project (COW), University of Michigan.
Graphics and calculations by Nusrat Sheikh and Andreas Wimmer.



1.4 Global trends in lost lives

Here, the patterns of man-made disasters such as wars and natural disasters converge to a surprising degree. Both for natural and man-made disasters the number of disasters shows an increasing trend while the number of fatalities has been decreasing (Figures 3 and 4). Both the probability of death from natural disasters and from war has declined, which may be contrary to perceptions in the general public.

Two different explanations have to be sought here. Presumably, the decrease in the number of drought victims contributed to the trend with regard to natural disasters. And in the late 20th century, famines have caused fewer fatalities and have shifted their occurrence, with a few exceptions, from the North (e.g. Russia) and Asia to Sub-Saharan Africa. In addition, mortality has been reduced significantly. Previous famines in Russia, China and India resulted in more fatalities than the more recent ones in Africa, even though these left up to one million people dead in Ethiopia. Also, the causes of famines connected with droughts lie partly in government failures and political conflicts (von Braun, Webb, Teklu, 1999).

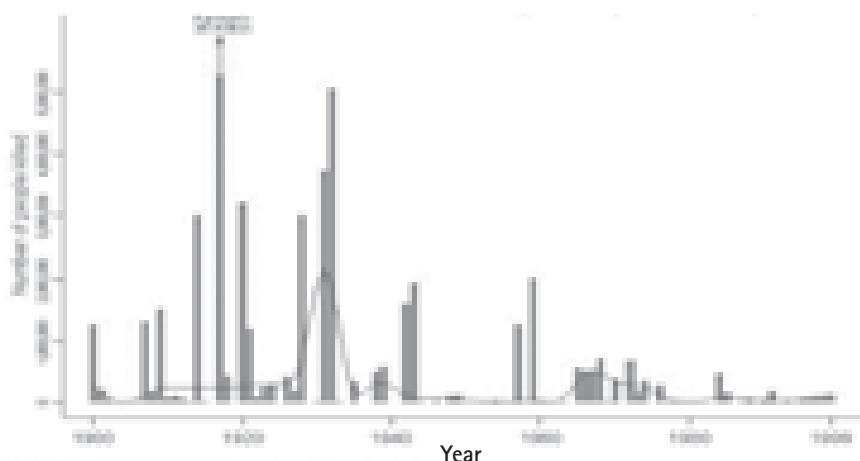
With regard to war victims, the major reason for the relative decline in the number of war victims as a general trend can be attributed to learning effects, deterrence during the Cold War and democratisation. After two disastrous World Wars, the international community set up new diplomatic instruments to prevent violent conflicts from escalating into full-scale wars and especially to avoid the drawing in of ever more actors and countries. More importantly, however, the Cold War put the risk of escalation with disastrous consequences so high that full-scale wars between more than two countries became very rare. Lastly and perhaps most importantly, the prospects of democratic governments declaring war on another country are very slim. The three waves of democratisation that the 20th century saw also gradually reduced the odds of full-scale wars developing between whole groups of countries.

Both for natural and man-made disasters, their actual number shows an increasing trend, while the number of fatalities has been decreasing. However, with regard to wars, there is a general lack of data on casualties among civilians.



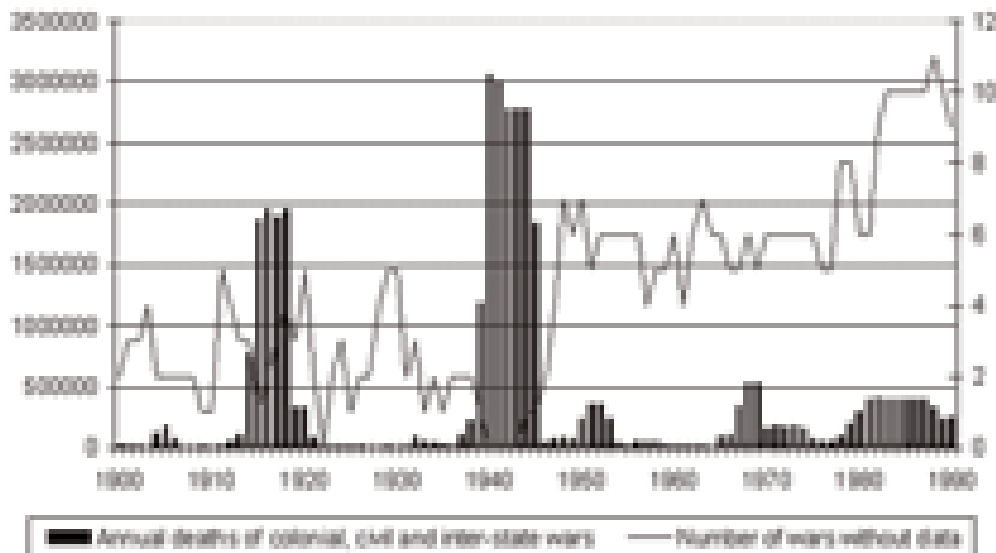
As Figure 4 shows, this interpretation rests on rather sketchy information since data are missing for many civil wars. It should also be noted that casualties among civilians are not included due to lack of data. Given that the proportion of civilians among the overall victims of violence has generally risen over the twentieth century and reaches proportions above 95% in cases such as Uganda, Sudan, Somalia or Mozambique (Stewart, Huang, and Wang 2001:74), establishing a sufficient database on civilian deaths appears to be all the more crucial for an overall assessment.

Figure 3: Number of natural disaster fatalities, 1900-1999



EM-DAT: The OFDA/CRED International Disaster Database (<http://www.cred.be>)
 Source: Feldbrügge, von Braun (2002)

Figure 4: Annual death toll of wars, 1900-1990



Source: Version 3.0, The Correlates of War Project (COW), University of Michigan.
 Graphics and calculations by Nusrat Sheikh and Andreas Wimmer.
 Comment: Yearly death toll figures were calculated by dividing the total number of victims of a war by the number of years. Only battlefield deaths are included in these figures.



1.5 Global trends in losses of tangible assets due to natural disasters

Contrary to the trend in loss of human life, a significant increase in economic damages caused by natural disasters can be observed in recent decades. However, the property damages experienced, rising in absolute terms and expressed in monetary units, may reflect a real growth of damages, or a rising living standard with mounting property values, or an inflation-induced increase. To take this into account, the Munich Re (Münchener Rück - a German-based reinsurance company) has calculated both the inflation-induced increase and the increase in property values owing to rising standards of living since the early 1970s. It chose the gross domestic product (GDP) to roughly approximate the changed standard of living. The Munich Re concludes that regarding the increase of losses triggered by major natural events, inflation and a general accretion of value during the years 1970 to 1998 play an important role. But the insurance company goes on to reason that damages are clearly on the rise in real terms. According to the Munich Re, GDP-adjusted economic damage amounted to US\$ 315 billion in 1970-79, US\$ 283 billion in 1980-1989 and US\$ 636 billion in 1990-1999. The damage figures provide clear evidence of an increase in the 1990s compared to the 1980s. According to the Munich Re (1998, 2000a, 2000b), the economic losses are distributed relatively evenly: storms, floods and earthquakes each make up 30 % of the recorded losses, while other hazards account for the remaining 10 %.

We thus perceive two contrasting trends: a decrease in loss of human life over the past century and increasing economic damages, at least during the last decade. As a working hypothesis to account for this picture we assume that the coping capacity to deal with natural disasters has increased. It is difficult to determine how much this is thanks to international organisations and how much credit should go to national and local ones. In political, organisational and logistical terms, international relief agencies at inter-governmental, governmental, and NGO level have certainly learnt enormously in terms of how to react to major disasters. Compared to 50 years ago, they nowadays dispose of much higher capacities and resources for interventions in ongoing disasters.

As far as natural disasters are concerned, two contrasting trends have been observed. While there was a decrease in loss of human life over the last century, economic damage has been on the increase over the last decade.



Effects of a volcano eruption, Pinatubo, Philippines

2. War-caused disasters and war as hazard

The picture is less clear when it comes to the internal coping capacities. One major weakening force that reduces institutional capacity to cope with hazards is violent political conflict. It comes as no surprise that countries that have experienced institutional breakdown or even state failure due to civil wars are prominent among the list of cases with severe natural disasters (Ethiopia, Mozambique). Interaction between natural disasters and violent political regime change also exists, as was the case in Ethiopia twice when regimes that proved incapable of dealing with drought-triggered famines in the 1970s (imperial system) and 1980s (communist system) were subsequently overthrown.

The effects of natural disasters are especially dramatic in war-torn societies. With all political and institutional capacities being focused on winning the upper hand, violent conflict undermines coping capacities and renders prevention policies virtually impossible.

In general, the effects of droughts and other natural disasters, including epidemics, are specifically dramatic and lead to high death tolls in war-torn societies such as Afghanistan or Sudan because war undermines the capacity to react early and efficiently to a natural disaster, with all political and institutional capacities being focused on winning the upper hand in the conflict. Violent conflict also makes prevention policies almost impossible. Dams are not built, efficient river management systems cannot be put in place, and long-term reforestation and other anti-erosion policies fail to be implemented. In some of the conflicts of the nineties, such as in Sudan or Ethiopia, human disasters are even actively promoted and coping efforts actively undermined by the warring parties in order to starve out the population under control of the enemy. Hunger then becomes a weapon in the arsenal of warfare tools.

On the other hand, war and protracted conflict not only reduce the coping capacities to deal with natural disasters but themselves represent major man-made disaster, threatening human lives and disrupting communities. In what follows, we concentrate on the last wave of violent conflict, mostly civil wars, that characterised the outgoing 20th century and have a closer look at the causal mechanisms producing these wars.

2.1 Conflict patterns since 1989

Since the fall of the Berlin Wall, ethno-nationalist conflict has become the dominant form of mass political violence. The intransigence of ethno-nationalist politics led to disaster in Bosnia; on the southern borders of the former Soviet Union, a bush-fire of separatist battles has been ignited; Sri Lanka finds no more respite than do Myanmar's hinterland or southern Sudan. This list could easily be extended: in three-quarters of all wars world-wide between 1985 and 1992, ethno-nationalist factors predominated (Scherrer, 1994). Ted Gurr lists a total of 49 fields of ethno-political conflict for the 1993-1994 period (Gurr, 1994), when the trend reached its peak.

How can we explain this trend? According to some authors (Gellner, 1983; Nairn, 1993), the new states that emerged from the former communist block are seen as being simply too heterogeneous in terms of ethnic or cultural diversity to be able to function as 'normal' nation-states. After the fall of the Iron Curtain, the hitherto 'frozen' drive for national self-assertion was liberated and will follow its natural course until homogeneous nation-states emerge (cf. Simpson, 1994). However, we now know that there is no clear causal pattern linking ethnic and cultural heterogeneity to violence.³

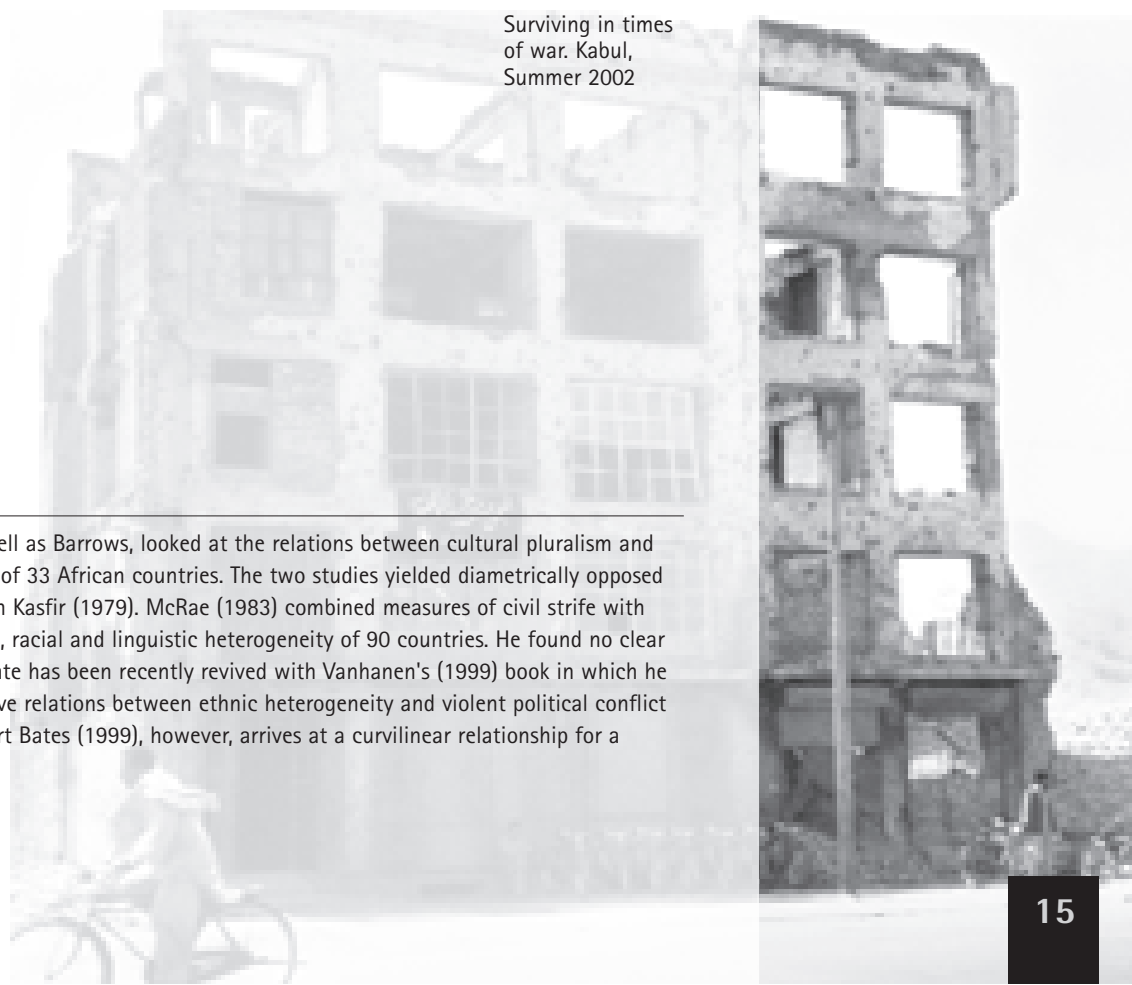


Another popular thesis is Samuel Huntington's (1993) clash of civilisations replacing competition between communism and capitalism during the cold war. The thesis has received much attention despite its rather poor empirical performance. Ted Gurr (1994) has shown that the dividing lines in most of the conflicts since 1989 have not run parallel to the civilisational fault-lines that Huntington identified (see also Russett, Oneal and Cox 2000). It is not orthodox versus non-orthodox Christians, Confucians versus Christians, Muslims versus the rest, but rather Protestant versus Catholic in Northern Ireland, Muslim against Muslim in Iraq and Turkey, etc.

The approach developed in ZEF over the last few years (cf. Wimmer, 2002; Wimmer and Schetter, 2002) explains the current wave of conflicts with the creation of new nation-states after the dissolution of the communist, multinational empires and the corresponding changes in the principles of political legitimacy. In empires, ethno-cultural distinctions may have played a certain role in defining the hierarchical strata that made up society, distinguishing between nobles and commoners, conquerors and conquered, etc. The balancing-out of relationships between these estates may therefore have entailed some political mobilisation along ethnic lines. However, ethnic relations take on completely new dynamics within the sphere of a nation-state - i.e. of a state aspiring to represent one nation. It is the institution of the nation-state that raises the question as to who may belong to its nation, because that state embodies the idea and political practice of national sovereignty. The state should, so to speak, be dyed by a nation's colour and designate the 'people' in whose name it rules over its territory. In many cases, the new elites are not capable of marshalling enough support for their project of nation-building. A fight erupts over which 'people' the state should belong to, and political mobilisation proceeds along ethnic lines.

The current wave of conflicts is strongly linked to the creation of new nation-states after the dissolution of the communist bloc. Ethnic relations take on completely new dynamics within a nation-state, i.e. a state aspiring to represent one nation.

Surviving in times
of war. Kabul,
Summer 2002



³ Morrison and Stevenson, as well as Barrows, looked at the relations between cultural pluralism and political instability in a sample of 33 African countries. The two studies yielded diametrically opposed results. Both are cited in Nelson Kasfir (1979). McRae (1983) combined measures of civil strife with indexes of the relative religious, racial and linguistic heterogeneity of 90 countries. He found no clear pattern of correlation. The debate has been recently revived with Vanhanen's (1999) book in which he tries to establish a linear positive relations between ethnic heterogeneity and violent political conflict on the basis of new data. Robert Bates (1999), however, arrives at a curvilinear relationship for a sample of African countries.



Box 1: Displacement due to Violence in Colombia

The armed conflict over economic and political power in Colombia has forced approximately 1,150,000 people, the majority of them women and children, to leave their homes since 1985. During the last few years, displacement has intensified, increasing by 38% between 2000 and 2001. A project funded by the Colombian National Planning Department and Colciencias and completed in 2001 aimed at providing answers to these questions by analysing the determinants and effects of displacement at the household level. Household interviews in expulsory and receptor locations confirm the significant role of violence and perceptions of insecurity in motivating displacement. The analysis indicates that landowners, members of local organisations, and younger household heads face the highest risk of becoming the direct target of threats, which appear to be the most important trigger of displacement. Obviously, any real solution to the displacement problem requires the end of violent conflict in Colombia. However, as long as peace remains unlikely some policy recommendations emerge. Government protection could be focused more on those groups most likely to be threatened.

Households that opt for displacement for preventive reasons are more likely than those reacting to sudden threats to consider the potential advantages and disadvantages of alternative options, including the choice of receptor location. Improved information predicting future “hotspots” of violence and assessing alternative destinations would be desirable.

Kirchhoff, S. and A. M. Ibañez. 2001. “Displacement due to Violence in Colombia: Determinants and Effects at the Household Level”. ZEF Discussion Papers on Development Policy 41, October 2001.

2.2 Changing policy approaches to internal wars and conflict

How has the international community reacted towards this last wave of nation-state formation and the human disasters that it has produced, such as the dramatic events following the civil wars in Nigeria, Uganda, Burundi, Yugoslavia, Georgia, Chechnia and so on?

Not only has the end of the Cold War unleashed this wave of civil wars, at the same time it has also changed the policy approach towards conflicts in Western capitals in at least three different ways. First, the propensity for direct intervention in developing countries has been heightened, since the risk of escalation into a full-scale world war, a threat ever-present during the period of rivalry between nuclear powers, has now been reduced. Second, with the virtual defeat of the communist counter-model, Western political and economic doctrines have become almost globally valid. Accordingly, the responsibility to help developing countries and especially the countries of the former Eastern bloc to achieve democracy, legal security, good governance, and sustainable economic growth based on a market economy has risen considerably. And so has the impulse to help settle war and violence in order to achieve a politically stable environment for democratic and market reforms. Third, the wars, especially in the Balkans, but also in Iraq, Turkey, Afghanistan, Sri Lanka,

The end of the Cold War has changed the West's policy approach towards conflicts. The propensity for intervention in developing countries has been heightened, Western doctrines have become almost globally valid, and the flow of refugees to the West triggered by the wars has greatly enhanced awareness of living in an interrelated global system.



Somalia, Ethiopia and elsewhere, have triggered a flow of refugees to the West that has greatly enhanced the consciousness of living in a unified, interrelated global system. The refugees have contributed substantially to building up the political will for prevention, early action, intervention, and peace-making that complements the more instrumental power-balance arguments of traditional foreign policy. Seen from a global point of view, the many small-scale wars and confrontations spreading in the newly independent states or in democratising societies of established states have replaced the confrontation between East and West as the main lines of conflicts and as major global security risks—albeit on a reduced scale compared to the truly catastrophic dangers of a Cold War confrontation.

During the 1990s, many governments adjusted their foreign and security policy to this complex constellation of multiple small-scale confrontations with no clear strategic implications for Western countries. More specifically, several policy approaches to prevent, mitigate, or peacefully settle conflicts have been formulated during the last decade, both by international organisations such as the UN, NATO, the Council of Europe, and the OSCE, and by national governments and various sectors of the NGO community. These include, first, a number of options for outside intervention to prevent escalation in the pre-conflict phase. Several approaches and concepts, including early-action, round-table diplomacy, permanent field missions, etc., have been developed, and institutions such as the OSCE, the Council of Europe, and various national governments have become active in this field.

Second, new techniques for negotiating peace in protracted civil wars have appeared and have been combined or alternated with military interventions and peace-enforcing operations. They range from negotiations in sequestered places under heavy political and military pressure from the international community (such as the negotiations in Dayton, Rambouillet, or Stormont) to behind-the-scenes negotiations at the kitchen table organised by non-governmental organisations, such as the famous Oslo negotiations between the PLO and Israel, as well as various forms of combining official and unofficial diplomatic efforts to bring about peace, now generally labelled “multi-track” diplomacy.

Third, a whole new branch of mostly NGO activities has developed around the idea of mediation and dialogue between communities in conflict, some involving mostly the leadership level, others targeting civil society organisations from the different groups or their grassroots. The aim is to overcome entrenched stereotypes and intolerance considered to be at the root of the conflicts. Techniques include interactive conflict resolution, conflict transformation, and finally psycho-political trauma cure.

Fourth, a variety of unspecific preventive measures at the level of political institutions have also been fostered, among other reasons because they are thought to bring peace and stability to conflict-torn societies. This includes good governance, the rule of law, and most importantly, democratisation. Many policy-makers believe that this trio of institutional reforms will automatically lead to a “civilisation” of political behaviour and also to a de-escalation of ethnically-toned political tension.

These new or rediscovered policy measures have been offered, tested, or implemented with varying degrees of success in a number of conflicts since 1989: in Ireland, Bosnia, Macedonia, Corsica, Sri Lanka, Indonesia, Bangladesh, The Philippines, Chechnya, Georgia, Turkey, Nagorni-Karabach, Sudan, Sierra Leone, Burundi, Rwanda, Nicaragua, Ecuador, Guatemala, and Colombia, to name just a few of the more

During the 1990s, many governments adjusted their foreign and security policy to addressing multiple small-scale confrontations. New techniques for negotiating peace in protracted civil wars have been combined with military interventions and peace-enforcing operations.

prominent examples for each continent. What have we learned from these experiences with the new modes of preventing and solving conflicts?

A new ZEF publication draws conclusions from a series of 35 articles dedicated to a systematic analysis of the state of the art in dealing with conflicts.⁴ A “new realism” emerges from this exercise that can be summarised in five points. Each has an aspect of research and one of policy-making.

- Insight into the complexity of ethnic conflicts leads to modesty as regards the expected effects of interventions and to a plea for flexibility and a culture of learning within intervening organisations.
- Knowing about the singularity of each constellation of conflict reinforces the case-by-case approach, especially in the domain of institutional design.
- The growing acknowledgement of the deep-seated nature of these conflicts, relating to the basic state structures, reinforces the view that a multi-stranded approach for intervention and conflict transformation may be necessary, taking into account the specific constellations of power and the interests of all the major actors.
- From a researcher’s point of view, there are important reasons why ethnic conflicts are tenacious, such as the economy of war that may develop in the shadow of these conflicts. More generally, ethnic conflicts seem to be of a long-term character, and the most appropriate time units to understand them may be generations. The policy recommendations that follow from this are to take these economic factors seriously when trying to broker a settlement of a war and to develop a long-term vision even for shorter-term policy programmes.
- The institutional and ideological constraints on intervening organisations have become clearer in the last decade, and it seems that creating the right institutional incentives and broadening the range of models and approaches may help overcome these limitations.

Ethnic conflicts seem to be of a long-term character and may need to be viewed in the context of generations. When attempting to broker settlements, long-term visions may even be required for shorter-term policy programmes.



Ruins by civil war.
KwaZulu Natal,
South Africa

⁴Wimmer, A., Goldstone, R., Horowitz, D., Joras, U., Schetter, C. (eds.): Facing Ethnic Conflicts. Toward a new Realism. Forthcoming.



Box 2: Political conflicts and natural resource abundance

The collapse of the Cold War has intensified the search for the causes of civil violence. Some highly popularised explanations see creeping ecological and demographic pressure as the causal mechanism behind many of today's violent conflicts, competing with standard explanations within the social sciences. Apparently increasing 'environmental scarcity' and resultant Malthusian pressure have created a new age of insecurity that is driving people to fight for 'survival'. Others argue that conflict is caused by 'greed' rather than 'grievance' or vulnerability, and that an abundance of natural resources supplies the motivation for organising violence, particularly mineral wealth. Resources offer 'lootable' income over which to fight, making costly strategies of violence viable. In other words, 'greed' is the motivation and easy 'finance' allows large-scale conflict to be generated.

ZEF research has utilised alternative models, and empirical testing procedures confirm support for greed-based explanations. Countries with abundant mineral wealth are particularly unstable, highlighting the need for governing resources better to ensure both peace and sustainable development. This research also tries to bridge the economics of war literature with those of political science to offer a broader perspective on resource wealth and the failure of governance. In future, policy-makers will do well to think creatively about ways financial aid and technical assistance are used to foster institutions around wealth management as much as around its creation.

de Soysa, I.: "Paradise is a Bazaar? Testing the Greed, Creed, Grievance and Governance Hypothesis on Civil War". In: *Journal of Peace Research* 49 (4), 2002, pp. 395-416.



3. Natural resource degradation: the long-term perspective in the case of land degradation

Natural resource abundance, especially wealth in mineral oil or other lootable resources such as diamond or gold mines, considerably heightens the risks of war-caused disasters in developing countries, as ZEF research has confirmed (see Box 2). On the other hand, natural resource scarcity in basic agricultural resources such as water and land may lead to creeping natural disasters, as the Uzbekistan case makes clear (see Box 3). The following section focuses on land degradation as one of the potential sources of creeping disasters.

Conceptually, land degradation sets in when the potential productivity associated with a land use system becomes non-sustainable or when the land is not able to perform its environmental regulatory function (Katyal and Vlek, 2000). This implies that land has partially or totally lost its renewable potential. Except for some chaotic natural events, land degradation is mainly due to interaction of the land with its users. If the carrying capacity is exceeded persistently, land gets progressively degraded and loses the ability to renew itself. Also, mismatches of land use and land attributes lead to degradation. Since humans determine land use, Blaikie and Brookfield (1987) suggested that by definition land degradation should be considered a social problem. Restorative management, including appropriate inputs and technologies, can reverse the negative effects of exploitation by humans, but lacking the capability or incentives (such as under tenure arrangements) to invest in land, small and marginal farmers the world over are doomed to exploit their limited resources, often leading to land degradation (Syers et al., 1996). In the process, soil loses quality (SSSA, 1996) and becomes infertile, more erodible and compacted.

Along with anthropogenic factors, a range of natural factors endemic to territories susceptible to desertification are believed to influence the progress of land degradation (Blaikie and Brookfield, 1987; Lal, 1997a). Year-round aridity, but more so high variability in rainfall makes dryland regions climatically unstable and particularly prone to drought. In fact, drought and desertification have been related so intimately that the former is often associated with the incidence of desertification (UNEP-UNCOD, 1978, and Ahmad and Kassas, 1987). Within the world's drylands (Table 3), the area affected by land degradation/desertification amounts to 3,592 million ha (UNEP, 1991).

Sustainable land use implies harmony between the use of land and its ability to maintain or renew its quality. Degradation sets in once this balance is upset and soil, water and vegetation are damaged.

Sustainable land use implies harmony between man's use of land and the land's ability to maintain or renew its quality. Degradation sets in once this balance is upset, and soil, water and vegetation - the basic elements of land - are damaged, as manifested in several different ways. Soil loses life-sustaining topsoil (by erosion) and some essential nutrients (thus developing nutrient imbalances), accumulates harmful chemicals (by salinisation, alkalisation or acidification), or develops physical deformities such as compaction or textural discontinuity in the profile (including hard-setting and pan formation).

Water accumulates close to or above the soil surface (waterlogging) or becomes scanty or salty. Vegetation loses productivity of useful plants due to systematic deforestation, overgrazing by livestock, and invasion by less useful species, resulting in loss of biodiversity.

Table 3: Extent of soil degradation within the area affected by land degradation.

Land use Category	Total area within drylands (million ha)	Area affected by land degradation (million ha)	Area affected by soil degradation (million ha)
Irrigated cropland	145	43	4
Rainfed cropland	457	216	216
Rangeland	4,556	3,333	757
Total	5,158	3,592	1,016

Data source: UNEP (1991)

The preponderance of evidence collected thus far confirms that land degradation is a man-made problem. It is not a new phenomenon and has been in existence since the dawn of agriculture (Barrow, 1991 and Hillel, 1991). What is new is the intensity of degradation in recent times. For example, Rozanov et al. (1990) showed that the soils of the world lost 25.3 million tons of humus per year on average since agriculture began some 10,000 years ago. However, average humus losses were 300 million tons per year in the last 300 years and 760 million tons in the past 50 years. So they appear to accompany the growth of population, expansion of croplands, destruction of vegetation, global warming and emergence of yield-enhancing technologies. In essence, the last 50 years have been a saga of economic growth and ecological losses, both unevenly distributed. The inherently disadvantaged dryland environments have suffered relatively more ecological damage and less economic gain. Although the causes of land degradation are well-documented, it continues to spread at a rate of 6 million ha per annum (FAO/UNEP, 1984).

Dregne and Chou (1992) estimate that nearly 1,860 million ha, or little more than half of the desertified area world-wide, requires rehabilitation. The cost of rehabilitation over a 20-year period was calculated to be about US\$ 213 billions. If not rehabilitated, Dregne and Chou figure that the income foregone (over a 20-year period) could equal a staggering US \$ 564 billions. Razanov et al. (1990) believe that the annual loss through degradation (6 million ha) is practically irreversible. The reliability of these statistics has been a subject of debate (Mainguet, 1994, and Thomas and Middleton, 1996). Although the accuracy of the numbers may be argued, the magnitude of the problem and its potentially negative impact on sustainable development is beyond question. In fact, if present trends are any indication, it is anticipated that the severity of desertification will increase as the pressure of population on land mounts, becoming all the more intense in developing countries.

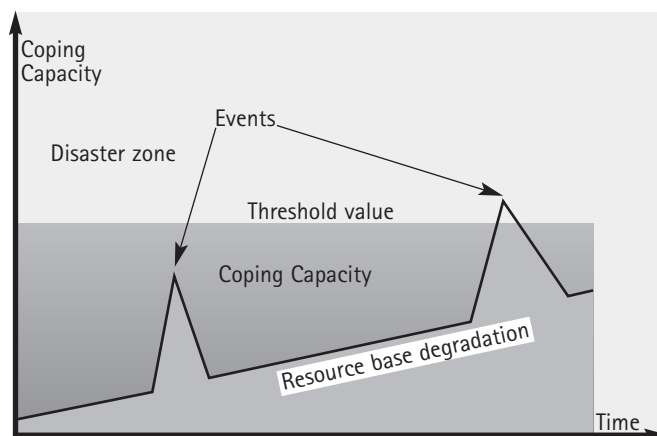
Statistics on disasters resulting from creeping events are difficult to come by. First of all, the consequences of such processes are coped with in many different ways. In the case of desertification, for instance, strategies are applied that reduce population pressure through permanent out-migration, migrant labour and remittances. Although often associated with personal tragedies, this uprooting of societies rarely

Degradation has a profound impact on sustainable development. If present trends are anything to go by, the severity of desertification will increase as the pressure on land mounts, becoming all the more intense in developing countries.

occurs in such a massive way that it would be classified as a disaster. In some cases such processes will result in conflict. This has above all occurred in the area of immigration such as was seen in Abidjan and Tamale towards the end of last century, with migrants coming from Mali and Togo, respectively. Assigning such disastrous conflicts to desertification remains difficult as many other processes may be at play simultaneously.

The Dust Bowl in the Great Plains of North America in the 1930's is one of the best-documented disasters caused by extreme drought following misuse of land. As a result, naturally occurring cyclones crossing the region turned into dust storms sweeping of millions of tons of rich earth from unvegetated and disturbed soils. Because of the Dust Bowl, millions of hectares of farmland became useless, and hundreds of thousands of people were forced to leave their homes (Lee et al., 1999). By 1940, 2.5 million people had moved out of the Plains states. Of these "ecological emigrants", 200,000 moved to California, where they did not receive a warm welcome (Bonniefield, 1979).

Thus, a plausible connection exists between resource degradation and vulnerability. The ability of a population to cope with such problems as epidemics or drought is often reduced in a region where the production base has been eroded. This can be depicted as follows (E. Plate, personal communication):



An extreme event may exceed the coping capacity of a population when it occurs in a situation of a degraded natural resource base, whereas it might be dissipated when the resource base is still intact.

We can see that an extreme event may exceed the coping capacity of a population when it occurs in a situation of a degraded natural resource base, whereas it might be dissipated when the resource base is still intact. The time it takes the population to recover from the event is an expression of its resilience. Examples are the consequences of earthquakes or mudslides when land degradation has forced people to move into areas where they are more vulnerable and less able to cope. Such a situation was seen in Venezuela and other parts of Central America in the past decade, when extreme rainfall events caused disaster in deforested areas where they would have been of little consequence in the past.

If natural resource degradation does lead to greater vulnerability, the consequence has to be an increase in the rate of occurrence of natural disasters in the areas it affects. Unfortunately, statistics on disasters relating to the status of the natural resource base are not available. Natural disaster statistics by country or world region are not helpful, as economic development has increased the coping ability of some sub-regions that are included in the aggregated statistics. There is an urgent need to



document and analyse the incidence of such disasters in a disaggregated fashion in order to alert policy-makers regarding regional vulnerability shifts due to long-term trends such as desertification or global climate change.

Land degradation is not a sudden event but a gradual process. The costs of preventing land degradation are not high if action is taken early. Once severe, however, and reclamation becomes economically prohibitive, the land must be abandoned. Currently, a consistent loss in biological productivity is the general criterion employed to distinguish degraded from non-degraded lands, and the degree of this loss distinguishes among degradation classes. It is more of a confirmatory criterion for degradation that has already occurred, since it cannot predict whether the land has an inherent tendency to degrade. Late diagnosis adds to the cost of reclamation and can make land practically irrecoverable, causing sustained environmental damage and reducing the capacity to cope with disastrous events such as storms, floods or landslides.

There is an urgent need to develop indicators that can predict the onset of desertification. Rubio and Bochet (1998) have given a list of selection and evaluation criteria that may be employed to develop an assessment system of land degradation/desertification by means of indicators.

Solving or mitigating of land degradation will also require people's participation. Blackburn and Holland (1998) define people participation as the full involvement of local populations in the identification of problems and the seeking of solutions with teams of scientists, planners, and development specialists. Participation gives local people a chance to have a say in what takes place in their area in the name of development (Rhoades, 1999). It considers people's aspirations and needs as an integral part of the development agenda, which makes solutions 'demand-driven' (Rhoades and Booth, 1982). This more general lesson is of central importance in preventing long-term resource degradation and thus also the risks of exposure to natural disasters.

The involvement of local populations in identifying problems and seeking solutions with specialists is crucial to preventing long-term resource degradation and risks of exposure to natural disasters.

Small holder vegetable production and irrigation, Limpopo, South Africa





Box 3: Land and water mismanagement in the Aral Sea Region. Searching for ecological and legal-administrative restructuring to check a creeping disaster

The Aral Sea Basin has long been known as an ecological disaster area. The enormous extension of irrigation agriculture for the production of cotton by the former Soviet Union resulted in excessive overexploitation of the land and water resources. This has led to ecological and administrative conflicts with devastating economic and social consequences. And human health is at particular risk in the region.

ZEF has set up a project aimed at finding means for a sustainable increase in the efficiency of land and water use in the basin. An interdisciplinary approach is applied that integrates research on ecological, socio-economic and legal-administrative aspects of the problem. The chief co-operation partner in Uzbekistan is the University of Urgench, the capital of the province Khorezm, an agricultural area on the lower Amu Darya river. The project, funded by the German Federal Ministry of Education and Research (BMBF) and by the Ministry for Schools, Science and Research of the Land of North Rhine-Westphalia, is assisted by UNESCO and has the full support of the Ministry for Agriculture and Water Management of the Republic of Uzbekistan.

In November 2001, an initial “data mining” period of three years was started, in which full capacities for remote sensing and a Geographical Information System (GIS) are being built up in Urgench with the assistance of DFD-DLR (Deutsches Fernerkundungs-Datenzentrum der Deutschen Luft- und Raumfahrt) as a basis for a planned information centre. The compilation of soil maps, groundwater salinity maps, and maps that show the distribution of hedgerows and forestry plantations in the region has a high priority. Initial field studies on alternative land preparation techniques and on the suitability of tree species to be planted for additional ecosystem services have begun. An economic river basin model and a model of Uzbekistan’s economy will be developed by the economy work group in the project, and the legal and administrative situation of water distribution will be assessed by scholars of the social sciences.

The long-term plan for the project envisions that, based on the findings of this first phase, a large-scale field experiment will be set up in several pilot farms during which development options for the region will be tested in practice, which can then be implemented during a third phase, eventually to be positioned under the auspices of the German Federal Ministry of Economic Cooperation and Development (BMZ).



4. Preliminary conclusion

In this essay we have developed some tentative hypothesis with regard to the causal mechanisms responsible for disasters and the interrelationships between the various factors at work. The approach presented here views both man-made and natural disasters as the consequences of high vulnerability to extreme events - such as droughts, wars, or storms. Vulnerability in turn depends not only on the magnitude and frequency of extreme events (hazards), but also on the coping capacity.

We have developed a series of hypotheses both with regard to hazards and coping capacities. Regarding the frequency and magnitude of extreme events, our somewhat surprising conclusion is that, both for natural disasters and for man-made disasters such as wars, we observe a decrease in casualties and an increase in frequency. At the same time, at least the economic costs of natural disasters have risen over the past decade. Our assumption is that this is because coping capacities (especially international relief efforts) have increased over the past decades, thus allowing for a lowering of the death toll despite an increasing number of wars and natural disasters.

However, there are severe limitations in the data base—we above all lack longitudinal data on victims of civil wars and on civilian casualties. We also encountered a reporting problem concerning the number of natural disasters. Much more research is needed to confirm the general hypothesis that we derive from our exercise in trend estimation: that the world, on average, has become a much safer place, in contrast to the fin-de-siècle pessimism that dominates certain sectors of the published opinion.

On the other hand, our data also clearly show that the risks of exposure to disasters are very unequally distributed over the planet. They are much higher for people living in low income developing countries, where most major wars of the recent decades were fought and where most of the victims of natural disasters were to be found. Our hypothesis is that a weaker coping capacity explains this unequal pattern of distribution:

- a higher frequency and intensity of violent political conflict destroying the institutional capacity to react to extreme events. This higher frequency can be attributed to the early stages of processes of nation-state formation that often entail the politicisation of ethno-cultural differences and that may escalate into civil wars.
- a higher degree of poverty which makes survival and prevention strategies such as insurances inaccessible because long-term investing in mitigation of future risks is not affordable for poor people; poverty also reduces the capacity for institution building beyond the social capital invested in everyday social networks. Weak institutional development in turn represents a major disadvantage for developing adequate coping strategies.
- a more intense degradation in the natural resource bases and at the same time a higher dependency on natural resources that both reduce the space for adaptation and recovery in the face of extreme events. The high level of degradation may be explained by geographic location, higher rates of population growth, higher dependency on agriculture and lower institutional capacities to implement conservation strategies.

The risks of exposure to disasters are much higher for people in low income developing countries, where most of the victims of natural disasters were to be found. This unequal pattern of distribution is due to a weaker coping capacity in these countries.



More research is needed in order to confirm these three sets of hypothesis, and, more importantly, in order to know more about the linkages between ecological, economic and political factors. What we are especially lacking solid research results on is

- the relationship between natural resource degradation and political conflict. There are currently two opposing bodies of literature. The first assumes that resource degradation leads to heightened competition over natural resources such as land or access to water, which may ultimately spill over into the political sphere and lead to endemic political violence or even civil wars. Much of this literature is, however, of a very speculative nature, and we lack solid empirical research establishing the relationship (Gleditch 1998). Another, now much discussed thesis holds that it is abundance in natural resources such as oil, diamonds and other “lootable” goods that explains civil wars, not scarcity (see Box 2). A comprehensive view encompassing the consequences of natural resource scarcity as well as abundance for political conflict and war is still lacking.
- the linkage between long-term natural resource degradation and the occurrence of natural disasters. In this essay, we have developed some ideas of how to approach this heavily under researched topic. We assume that knowing more about how slow and gradual processes of degradation influence the probability and magnitude of fast and catastrophic events may also help to design prevention strategies that will in turn lower the risk of natural disasters.
- The interlinkage between war, poverty and resource degradation as factors producing complex emergencies. In this essay, we have emphasised our impression that many of the major war zones are at the same time regions with high degrees of resource degradation and high occurrences of natural disasters. Future research should first establish whether this impression can be confirmed on the basis of systematic data. We would then have to look at the precise nature of the relationship between political violence, poverty and resource degradation and how this constellation influences coping capacities and vulnerability.

Many of the major war zones appear to be regions with high degrees of resource degradation and large numbers of natural disasters. Further research is required to establish whether this really is the case on the basis of systematic data.

While ZEF will certainly take up one or the other of these open questions in its future research programs, the magnitude of the unresolved questions demands a cooperative endeavour where different research institutions and policy-making bodies address various facets of the overall picture according to their comparative advantage and fields of specialisation. We are convinced that an integrated view encompassing ecology, economics and social sciences has much to contribute to this venture and is necessary for a deeper understanding and, ultimately, also for reducing exposure to man-made and natural disasters.



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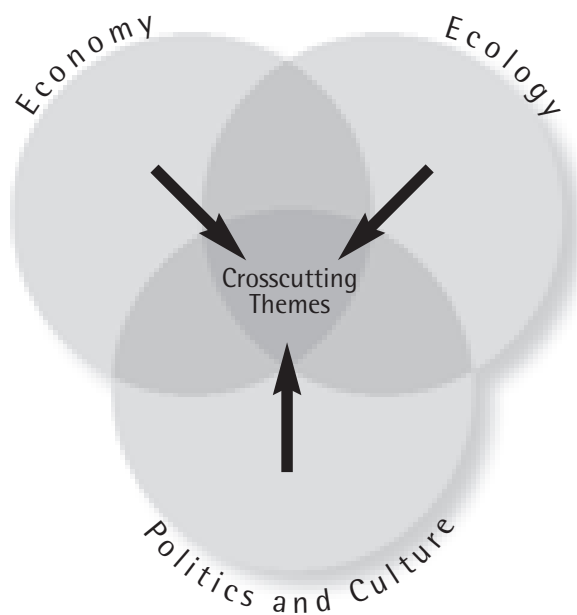


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Research

A strategy paper called 'ZEF - Strategy for the Future' was published in August 2001. It was developed by the directors and staff in collaboration with the ZEF International Advisory Board and sets a strategic direction and long-term goals for the institute over the next ten years. Like the report on the 2000/2001 academic year, the Annual Report on hand uses the strategic framework to monitor progress towards these long-term goals.

Figure 1: ZEF's research strategy



Development is rarely constrained by a single problem and can hardly be properly addressed by a single discipline. This is why ZEF has developed research programmes that link and integrate knowledge and capacities from two or all three of its departments.

As stated in its strategy paper, one of ZEF's major strategic goals is to move the core research activities in the direction of the crosscutting themes. In the following, we first describe the crosscutting research activities of ZEF undertaken during the 2001/2002 academic year, and then focus on the three more disciplinary focused research programmes of the individual departments:

- Political and Cultural Change
- Economic Development and Technological Change
- Ecology and Natural Resource Management.

Cross-cutting Themes

Development is rarely constrained by a single problem and can hardly be properly addressed by a single discipline. This is why ZEF has developed research programs on crosscutting themes of central importance for the developing world. These programs link and integrate knowledge and capacities from two or all three of ZEF's departments. They focus on theories of development and change; poverty and equity; natural resource scarcity; and governability and governance.

1. Theories of Development and Change

The issue of “change” concerns fundamental aspects of development. This program aims at establishing a dialogue between natural science, economics and social sciences at the level of their basic theoretical models of change and development. In a first step, the most relevant models were identified and discussed with senior researchers from all three departments during an internal workshop in December 2001. In the second step, an international workshop relating to these models was organised. The preparation of these events has involved a fair amount of co-operation and exchange across the three ZEF departments.

The international workshop, “Paradigms of Change”, was held in Bonn from May 23 to 25, 2002. It brought together distinguished scholars representing such diverse specialities as climate change, molecular biology, behavioural studies, quantum physics in the natural sciences, economics emphasising the approaches of path dependence, new institutional economics, as well as evolutionary economics and financial economics, and, in social sciences, new modernisation theory, the historical strand in new institutionalism, critical rationalism, systems theory and transformation studies. The objective in bringing together this wide array of scientific approaches was to explore how far models of change from one specific disciplinary field can be related to those from others and which commonalities may be discovered between such models. Secondly, we wanted to discuss the possibilities and limits of an extra-disciplinary application of each of the approaches, and to foster cross-paradigmatic exchange in an open process of mutual learning. Finally, clues for a better understanding and conceptualisation of development going beyond teleological and linear concepts were explored. Based on the workshop, which was funded by the Volkswagen Foundation, a book publication edited by *Andreas Wimmer* and *Reinhart Kössler* is being prepared.

“Paradigms of Change”, an international workshop organised by ZEF and held in Bonn in May 2002, brought together distinguished scholars to explore the relations and commonalities between models of change from various disciplinary fields.

2. Poverty and Equity

To meet the Millennium Development Goal to reduce poverty by half by 2015, a better access of the poor to assets, institutions, technologies and markets is of urgent need. Millions of poor people are excluded from basic social services such as education and health care as well as from technological innovations. Finding solutions to overcome social exclusion through institutional and technology innovations is a central theme of ZEF’s research in the area of poverty and equity. While the focus is on rural areas, where roughly 70 % of the world’s poor still live and work, ZEF is increasingly putting rural-urban linkages into perspective.

ZEF research in the area of institutional innovations to overcome social exclusion concentrates on identifying determinants of participation in local organisations and insurance arrangements. ZEF research on technological innovations for poverty reduction explores the potentials of new information technologies for inclusion of the poor in the market economy, as well as making public goods more accessible for the poor.

ZEF research focuses increasingly on public goods for the poor, including health services, education and water, as well as access to rights and the court system. Research on health insurance is highlighted as an example below. ZEF research on poverty and equity has a strong emphasis on gender dimensions. This is reflected

particularly in a project on the effects of liberalisation and Foreign Direct Investment on women in Indonesia.

If hit by crisis, people frequently respond by creating long-term costs for short-term benefits, despite mutual insurance at local level. ZEF is investigating the outcome of recent innovations in the area of health insurance.

2.1 Access to health insurance

Communities and local organisations are tremendously important in attacking poverty as other actors like the state or the market are often non-existent, do not function properly or are not accessible for the poor. Communities and local organisations can be engaged in different activities like social service provision, lobbying or the provision of insurance. The latter point is of special interest. Various studies show that poor people indeed insure but often at high opportunity costs, e.g. they invest in low-risk, but also low-return activities. If hit by crisis, people are frequently forced to cope with the risk by selling assets, increasing their labour supply, e.g. through child labour, and by reducing their consumption, despite mutual insurance at local level. Many of these responses force a high long-term cost for a short-term benefit such as drawing children out of school or reducing the number of meals a day. Access to formal insurance could help to improve the risk management capacity of the poor, and ZEF is investigating the outcome of recent innovations in the area of health insurance. Three key questions are tackled:

- Are poor people willing to join a health insurance scheme and can such schemes work in rural and disadvantaged areas?
- What is the impact of these schemes on social exclusion and access to health care?
- What are the important determinants of a successful scheme?

Family supporting the sick, hospital in India



The first question has been investigated in rural areas of Ethiopia, where nearly half of the population do not have access to basic health care services. In a recently finished study, we examined health care demand behaviour, the willingness of rural households to join and pay for potential health insurance schemes and the institutional environment. The overall results of the study are very encouraging. More than 90 % of the households interviewed are willing to contribute to an insurance scheme. The results also reveal that both the rich and the poor are likely to join the scheme. Households are willing to pay 7 Birr (\cong one Euro, equivalent to around 3.5 % of their monthly income) per month on average to become a member.

Besides the financial aspect the institutional environment is also conducive to introducing small-scale insurance schemes as the idea of collective pooling of risks is already well-known and has long been practised. The so-called 'Iddirs' are one of the most stable, widely available and democratic indigenous institutions in Ethiopia. They help people to cover the expensive cost of funerals and sometimes give financial assistance to the family of the deceased. Iddirs could hence be used as a point of departure for health insurance.

The effects of community-based health insurance schemes on social exclusion and poor people's access to health care has been studied by ZEF and partner institutes in a multi-country setting drawing on the experience of Senegal, Rwanda, India and

Thailand. The findings of this recently finished research suggest that barriers to modern health care access can be overcome by community-financing (CF) schemes even in the context of extreme poverty. However, the determinants of participation in CF schemes have also shown a differentiation within the strata of the poor. Differences in access exist among the various countries. Whereas in Rwanda and India income turned out to be a non-significant variable in explaining participation, the probability of participation increases with a higher disposable income in Thailand and Senegal. This finding can be taken as an indication of implicit design and implementation features that allow communities to overcome the inability of the poorest of the poor in a community to participate in such schemes.

Regarding the scheme design, it seems that the fee collection procedure is of utmost importance for the integration of the poor within the community. Fees could be collected in cash or kind; there could be exemption mechanisms for the poorest; and the period when the premium is collected also matters. Finally, demand-targeted subsidies by charitable organisations or the government can help to promote the participation of the poor. These findings have important policy implications. Participation in local organisations is not cost-free and requires a minimum of income which the most disadvantaged often do not have at their disposal. Therefore, donors and policy-makers should be aware that it may be very difficult, even impossible, to reach the poorest part of the population when promoting participation in local organisations and institutions. In order to reach the poorest members of the community, the cost of participation would have to be reduced by the institutions themselves or the public sector would have to subsidise their premiums.

Access to information and communication technologies in Bangladesh

2.2 Access to information

In the area of technical change, a focus of ZEF's research on poverty and equity lies on information and communication technologies (ICTs). Scholars within economics, geography and from a business administration-background address the related ICT research issues. These technologies have the potential to substantially reduce problems of the poor resulting from a lack of information. Accessibility of ICTs and the Internet in particular is partly an issue of the physical availability of the service but is also related to complex socio-economic problems such as income, education, political influence, etc. The poor, especially those who reside in the rural areas where even the basic telecom services may not be available, are suffering from precisely the lack of communication on markets with the outside world and information that may enable them to escape poverty, such as that on public services.

A study on the rural telecom service in Lao PDR was undertaken to identify the impact of the basic telecom service, voice telephones, on the welfare of rural households. A household survey shows that telephone users were likely to be literate, to have completed more years of education than non-users, and to be more skilled. Despite this general pattern we also found that usage rates were quite substantial among the low-income group and those carrying out less-skilled jobs. Households from the poorer quintiles spend almost the same amount on telecom ser-





ZEF has examined the rural telephone service in Lao PDR. While telephone users were likely to be literate and more skilled, usage rates were also quite substantial among the low-income group and those carrying out less-skilled jobs.

vices as those from the richer quintiles. The answers to the question of reasons of use confirm that the most important characteristic of telephone users seems to be their thirst for information, and on average, literacy and income do not seem to be the exclusive prerequisites for telephone use. It has also been established that the presence of a telecom service makes people aware of the benefits and non-users start using it. Our econometric analyses prove that the use of telecom services explains 16% of welfare improvement between 2000 and 2001. These findings indicate that while the rural residents have substantial demand for ICT applications, the latter should be easily accessible in terms of price and technology to guarantee equitable access. This means that public policy has an important role to play in ensuring accessibility for the poor.

In September 2001, the Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) and the German Ministry of Economic Cooperation and Development (BMZ) commissioned the 'ICTs for Development' Team at ZEF to conduct a Five-country study entitled "Information and Communication Technologies for Development - Present Situation, Perspectives and Potential Areas for German Technical Co-operation in Peru, Lao P.D.R., Vietnam, Tanzania and Uganda". The results were presented in November 2001, and GTZ published the final report in April 2002. The study analyses opportunities and challenges in the countries in the field of ICT. Further country studies (Peru, Bangladesh, Lao P.D.R. and Central Asia) as well as a book on 'ICT for poverty reduction' are in the making. ZEF research is expected to be an important basis for German development co-operation in exerting the efforts envisaged by the G8 Dot Force's Genoa Plan of Action.

3. Natural Resource Scarcity

Land, water, forests and biodiversity are natural resource bases providing goods and services that are essential, useful or desirable for human beings, their societies or economies. In this way, natural resources are directly intertwined with developmental processes. As economic activities - ranging from subsistence to market-oriented economies - are the main driving forces of natural resource use, the interests of resource users are mainly directed towards economically valuable resources such as food, water, timber, industrial minerals, energy, genetic information or space. These resources are partly renewable, and partly non-renewable. Renewable resources (e.g. fish, wood, water) can be depleted in the short run by overexploitation but replace themselves in the long run, provided that certain thresholds are not exceeded. Non-renewable resources are a priori of finite supply, such as minerals or fossil fuels.

Resource scarcity is a relative state and depends basically on supply, demand and access. These aspects are influenced by a multitude of differing factors such as skills for exploitation, information, prices and market opportunities as well as the educational level, ethnicity, the way the resource user views nature and, of course, the absolute availability of a resource. Accordingly, different users of the same resource might have conflicting interests and goals. This conflict potential grows if development efforts result in an increase in population density and market integration causing a further exploitation of the natural resource base, leading in turn to resource degradation and depletion. The respective conflicts arise between stakeholders, social groups, nations or generations, but also between productive sectors such

Natural resource scarcity does not represent an absolute limit to development. Adapting to scarcity, for instance by using renewable resources in a sustainable way and replacing non-renewable resources by developing alternatives, is of vital importance.

as agriculture and industry or between geographic entities such as urban centres and rural areas. Most of the conflicts are strongly asymmetrical, having further-reaching consequences for one party than for the other.

Natural resource scarcity neither automatically leads to conflicts, nor does it represent an absolute limit to development. Here, the way in which societies are able to adapt to this scarcity is of vital importance. In other words, whether resource scarcity leads to conflicts or not is a question of management. Management goals to overcome resource scarcities include the sustainable use of renewable resources and the replacement of non-renewable resources by developing alternatives. Thus, processes might be initiated aiming at economic and societal development, political changes, technological innovations and, finally, the improvement of resource-use efficiency.



Bush chopper at work

It has been shown that the conflict potential with regard to natural resource scarcity is manifold, entailing consequences of high complexity. Also, adverse effects in one particular sector might be the symptom of a conflict in another. Most notably, this applies to ecological devastation the real causes of which are usually of economic, political or social origin. Consequently, rather than solving the problem, rehabilitating the environment might lead to a shift of the symptom. ZEF aims to elucidate developmental problems from different sides and therefore carries out its research on these issues in an interdisciplinary approach. The common objective of its projects in this area is to develop concepts for a sustainable use of resources. They cover research on ecological, economic, technological and institutional constraints that impair sustainable resource use. Projects deal with

- the development of fire-free alternatives to slash-and-burn agriculture in the eastern Amazon,
- the optimisation of water allocation in the Volta basin, and
- the development of concepts for the ecological and legal-administrative restructuring of land and water management in the Aral Sea region (see Box 4).

3.1 Fire-free alternatives to slash-and-burn agriculture in the eastern Amazon

More than a century ago, the first settlers occupied the region east of the Brazilian city of Belém, close to the mouth of the Amazon River, and since then smallholder agriculture has been practised there. Traditionally, fallow periods of several years play a key role in the farming system to maintain soil productivity. The land is prepared for cropping by slashing and burning the bush fallow. Burning is a cheap, simple, and fast way to remove fallow biomass. At the same time, the remaining ash fertilises the following crop. The great disadvantage of this type of land preparation, however, is the loss of nutrients and organic matter by volatilisation during burning.

In the Eastern Amazon, land preparation for cropping is done by slashing and burning the bush fallow, a cheap, simple, and fast way to remove fallow biomass. Its disadvantage is the loss of nutrients and organic matter by volatilisation during the burning.



In recent years, demographic pressure and integration in the market economy have led to an intensification of land use. This, in turn, might entail an irreversible degradation of the fallow system that could cause conflicts over agricultural land and forest resources as well as over social security and economic survival strategies of the rural population. Therefore, a research project aiming to adapt the fallow system to the present agricultural conditions was set up by the University of Göttingen and Embrapa Amazônia Oriental in Belém in 1991. ZEF came in as the principal partner in 1999. The project is funded by the German Federal Ministry of Education and Research (BMBF) and the Brazilian Research Council (CNPq).

The project follows a three-phased plan. It started with diagnostic research, which was followed by solution-oriented research including the development of technologies. The project has now reached its final phase of implementation-oriented research (1999-2003). Critical needs for improvement were identified during the diagnostic phase. Based on these results, fire-free alternatives to slash-and-burn have been developed, including a mulch technology, to avoid the loss of nutrients during the burning. To transfer the fallow vegetation into a manageable mulch, a tractor-driven bush chopper was developed in co-operation with the Institute of Agricultural Engineering of the University of Göttingen. The chopper cuts and chops the fallow vegetation and spreads the chips over the field. Additionally, a second chopper which is already on the market has been tested in the field. However, any chopping process involves costs, which would have to be covered by higher returns. Therefore, in-depth economic analyses are presently being carried out in co-operation with the University of Belém to capture farmers' returns from activities with and without mulching, fertilisation and other agronomic practices. A bio-economic whole-farm model will provide indications of the impact of alternative technologies on the income of the farm-household. Overall welfare gains will be derived when social effects related to the adoption of the new technology are quantified and results are scaled-up to a larger level.

The crucial point of any agricultural research is the adoption of the innovation by the farmers. Incentives to adopt the fire-free land preparation systems could derive from several components. For example, mechanised land preparation is generally interesting for farmers, as they no longer have to carry out the backbreaking manual slashing of the fallow vegetation. Preliminary estimates show that mechanised mulching does not cost more than slashing fallow vegetation if the latter is carried out by contracted fieldworkers. Furthermore, crop varieties have been found which perform much better in mulch systems than locally known varieties. As ash is not available, fertilisation is indispensable. Nevertheless, these investments pay off. It has been estimated that fertilisation doubles net returns of the system due to the much higher crop yields. Finally, whereas the fallow can only be burned during the dry season, the chopper can work at any time of the year. Thus, the farmer is not bound to the narrow "window" of the dry season for land preparation. Better adjustment of planting times and scheduling of harvesting into seasons of low product supply is possible, which allows for higher returns. All the innovations can be offered to the farmer as modules, so that the system can be improved step by step, according to farmer's needs and abilities. Thereby, farmers can control the degree of risk they are prepared to take. In the long run, mulching not only helps to reduce nutrient losses, but also contributes to the conservation of soil organic matter, thus improving soil properties.

Mechanised mulching does not cost more than the slashing of the fallow vegetation if the latter is carried out by contracted fieldworkers. Furthermore, crop varieties have been found which perform much better in mulch systems than locally known varieties.

Many farmers in the region have accompanied the project from the beginning, either as fieldworkers or as observers. Close contact to the research project over several years

influences the farmers' own land-use behaviour. Besides, farmers have to search for fire-free land use in any case. For legal and political initiatives restricting the use of fire in land preparation are putting growing pressure on them. Recently, farmers in the study region were observed collecting plant material to cover the extremely bare soil in pepper plantations. Perhaps such biomass transfer systems with permanent land use and mulch produced elsewhere will dominate future land use patterns in the region. But cutting and chopping of the vegetation on fallowed fields will certainly not lose its importance in the near future, particularly when land demand increases. This applies to the project region, but also to many other tropical rainforest areas world-wide.

3.2 Optimisation of water allocation in the Volta basin

The goal of the GLOWA Volta project is to develop, in collaboration with our Ghanaian and Burkinabe partners, a decision-support system to optimise water allocation within the Volta basin, curbing potential conflicts over this resource. Understanding the complex relations between the water cycle, climate, and economic development requires insights from many scientific disciplines. The real challenge of the GLOWA program is not only to collect information using the various means and methods of these disciplines, but also, and above all, to tie all this information together in a meaningful and quantitative way. We identified three integrative focal points where added value can be gained. In each of these, questions are answered that cannot be addressed by a single science:

- atmosphere/surface interactions,
- land-use change modelling, and
- water-use optimisation.

At each of these interfaces, scientists are challenged to collect and manage their information in a way and on a scale that enables neighbouring disciplines to work jointly with that data and generate additional information.

Atmosphere/surface interactions need to be understood to account for the feedback between climate and change in land-surface properties. The extensive efforts to simulate regional climate change with the MM5 atmospheric model depend crucially on the proper quantification of the effects that land surface changes have on the atmosphere. The integrative challenge is bridging the gap between meteorology and hydrology. In communicating with each other these two disciplines are confront-

The challenge of the GLOWA program is to tie information together in a meaningful and quantitative way. Scientists need to collect and manage their information with a view to enabling neighbouring disciplines to generate additional information.

Akasombo dam and the Volta Lake





ted with a very important scale gap. The smallest practical grid cell size for the MM5 model is about $9 \times 9 \text{ km}^2$. Most process-based hydrological models are on the scale of a uniform field in the case of evapotranspiration, or a hill slope in the case of runoff. Hydrologists do have either lumped conceptual models or distributed models with a very fine internal resolution of, for instance, $30 \times 30 \text{ m}^2$. But what is needed is a method to aggregate measurable physical properties of landscape elements (fields, slopes) into effective parameters on the $9 \times 9 \text{ km}^2$ scale. In some cases, such as albedo, one can simply take a linear average, but when it comes to parameters such as surface runoff, evapotranspiration, rooting depth or roughness length, aggregation is much more difficult. We are approaching this problem both empirically and through numerical simulations. Here, we focus on evapotranspiration.

Evapotranspiration is modelled using the Surface-Vegetation-Atmosphere-Transfer (SVAT) model, developed specifically for the MM5 atmospheric model. Scintillometers were installed in each of the three experimental watersheds to measure directly the sensible heat flux over distances of more than two kilometres. By measuring ground heat flux and net radiation, evapotranspiration can be calculated as the remaining term in the energy balance. Since scintillometers measure spatially aggregated heat fluxes, they are our key instruments in bridging the scale gap between meteorology and hydrology. In close co-operation with the Meteorology Department of Wageningen University, we have been able to make almost continuous routine measurements with the scintillometers in West Africa.

Land-use change is the result of social as well as physical factors. In its turn, land-use change plays a pivotal role in affecting local climate and hydrology. In parallel, we are developing different types of models, from classical multiple-linear regressions to state-of-the-art multiple-agent models. All models have in common that they are very data hungry. We have made important progress with better methods for data gathering. Land-use change tends to take place unevenly over space and time. As data gathering on the ground is time and money consuming, it makes sense to concentrate on intensive ground campaigns in those areas where change is indeed taking place. We call such areas “hotspots”, and we have used a two-tiered process to identify them. First, we mapped large-scale changes during a land-use workshop based on expert opinion from the region. We then used remotely sensed data to zoom in and quantify specific hotspots. Two hotspots are currently under intensive ground investigation: Wuripe, south-west of Tamale, where dense woodland is being replaced by agriculture, and the Northeast near Navrongo, where irrigation development is most intensive.

The Ghana Living Standards Survey (GLSS) contains regularly collected multitopic socio-economic variables. Specific surveys concerning variables not covered in the GLSS were undertaken, using a Common Sampling Frame that links our surveys to the GLSS. First, a cluster analysis of all villages in the GLSS was performed. This analysis also included evaporation and geology as important determining physical factors. From each cluster, one or two representative villages were selected for extensive household and community surveys. Although the survey was mainly socio-economically oriented, soil and water samples were also taken to be better able to capture household decision-making in its biophysical context and link up environmental information gathered elsewhere in the project. Finally, a shortlist of standard questions was developed that identifies the GLSS cluster to which the community belongs. These questions are used by natural scientists too, for example during ground truthing of the remotely sensed data, and serve as a “social positioning system”.

Research focuses on intensive ground campaigns in those areas where change is indeed taking place. Two of these hotspots are currently under intensive ground investigation: Wuripe, where dense woodland is being replaced by agriculture, and the Northeast near Navrongo, where irrigation development is most intensive.



Safe water source:
woman pumping
water from a bore
hole in Ghana.

Water-use optimisation is the third integrative activity in the project. Water use is economically optimised subject to hydrological and institutional constraints. Water optimisation will be the nucleus of the actual decision-support system forming the final outcome of the project. Because of its importance, the feasibility of linking hydrological and institutional functions was tested in a model early on in the project. We used a mathematical programming (or optimisation) model in which an objective function is maximised. The constraints under which water productivity is optimised can be hydrological and institutional in nature. This early model helps to define precise data needs in terms of water supply and demand. The model implements existing integrative knowledge and will gradually be enriched by updated information and new primary data. Presently, the model optimises over different water uses at thirteen nodes in the river network. The innovation is that optimisations can be carried out at different levels of aggregation. The optimisation model has active links to a large set of sub-models that contain auxiliary information such as institutional development scenarios and crop-water demand calculations. The present model helps to assess the economic and hydrologic tradeoffs between competing water uses, taking into account different forms of irrigation and energy sources other than hydropower.

4. Governance and Governability

The recent wash of the 'Third Wave' of democracy over much of the globe has raised the importance of understanding questions relating to democracy, the rule of law, and governance as these issues affect development. This cross-cutting research program focuses on political, economic and legal aspects of the factors determining governance and on governance-determined outcomes of socio-economic variables, working largely within the tradition of neo-institutionalism. The research addresses questions pertaining to political and institutional development that ensures the rule-of-law, the socio-political effects of globalisation, and the causes and concomitants of democratisation. The topics and specific projects are described in detail below.

4.1 Governance in the Caspian Sea Region: The political and social dynamics of resource-led development

The Caspian Sea Region has become a key strategic site because of its resource wealth. However, many studies show oil and natural gas wealth to have pernicious consequences, often resulting in serious political instability and sometimes civil war with regional implications.

The Caspian Sea Region has become a key strategic site because of its resource wealth. The leaders and ordinary people of the states in the region view oil and gas revenues as a veritable panacea, the means to prosperity and prestige. However, the experience of energy-driven developing countries from 1960 to 2000 offers no reasons to be optimistic. Many studies show oil and natural gas wealth to have pernicious economic, political, and social consequences, often with regional implications resulting in serious political instability and sometimes even civil war. According to economic theory, the increased rents and foreign exchange obtained from energy exports ought to raise investment and boost import capacity, accelerating economic growth. On the other hand, the political dimension of policy formation and the resulting social consequences are exemplified by such stark development failures as Venezuela, Nigeria, the Democratic Republic of Congo, Angola, etc. Many of the broadly defined problems relating to resource wealth have not been applied to the strategically important Caspian Sea region. The project, a collaborative effort between ZEF and the National Bureau of Asian Research (NBR) in Seattle, USA, will fill this gap by examining the 'resource curse' through institutional factors and governance, taking a broader perspective to complement the economic models. It focuses on the same area the Uzbekistan project is located in and will hopefully provide a complementary view on the politics of resource use.

4.2 Economic globalisation, political democracy and governance

ZEF has examined the political economy of the reform process associated with market liberalisation and global economic integration and the major factors determining the political will and capacity to implement far-reaching and costly reforms.

Increasing levels of globalisation and its political, social, and economic effects are hotly contested. Some argue that increased internationalisation of economic activity, exemplified by such yardsticks as growing trade and rapid spread of Foreign Direct Investment (FDI), will have pernicious effects within poor countries, while others dispute these claims. International and domestic policy-makers are inundated with highly polemical arguments, while activists on the ground are already pushing diverse agendas against various facets of globalisation, sometimes through violent action. This project has been examining key issues relating to economic, social, and political development under conditions of globalisation and hopes to inform policy-making with theoretically and more systematically derived evidence. ZEF is collaborating with the Development Policy Forum of the Deutsche Stiftung für Entwicklung (DSE) on the issue of business and violent conflict. Preliminary studies show that increasing trade and FDI are associated with social peace, not disarray as some pessimistic voices on globalisation claim.

4.3 Political science tools for assessing feasibility of economic reforms

In a related study, commissioned by the International Monetary Fund, ZEF has looked more closely into the political economy of the reform process associated with market liberalisation and global economic integration. We have identified the major factors that determine the political will and capacity to implement far-reaching and costly reforms, such as the balance of power in the political arena, the political independence of the bureaucracy, the steering capacity, etc. In a subsequent step, several methods were elaborated for assessing in an ex ante fashion the constellation of these factors and how they impact on reform prospects. We have designed three tools for this forecasting exercise: stakeholder analysis, Delphi survey, and institutional analysis.

4.4 Accessibility of constitutional jurisdiction

The need for comparing constitutional jurisdiction has intensified as a result of democratisation and the stress on the 'rule of law' for development. This project will bring together a collection of important constitutional court decisions on legal and political problems subsequent to transition from authoritarian systems. Because of Germany's experience in developing the principle of the Rechtsstaat (a state based on the rule of law), German court rulings in particular offer developing countries good points of reference for reforming their systems after transitions to democracy, particularly regarding such issues as how to delimit the roles of different branches of government. The project will make German and Spanish material accessible to developing countries in a convenient annotated edition in both English and Spanish. A project proposal has been drawn up in consultation with the German Constitutional Court.

ZEF has examined the political economy of the reform process associated with market liberalisation and global economic integration and the major factors determining the political will and capacity to implement far-reaching and costly reforms.

4.5 Enhancement of law-making for economic reform in Arab Countries: studies in Morocco, Egypt, and Jordan

Several Arab economies have embarked on structural adjustment and market liberalisation, signing free trade agreements with the European Union. Some, such as Jordan, are in a free trade agreement with the US. However, the institutional reform needed to open Arab economies to outside competition, increase domestic competitiveness, and promote investment has been incoherent. Clientelistic practices and ineffective enforcement continue to hamper reform. Focusing on Morocco, Egypt, and Jordan, this project aims to:

- understand the process of law and regulation making for economic integration and investment promotion,
- understand the impediments to a coherent and participatory process of law and regulation making and
- discover the incentive structure of the main participants in that process.

The units of analysis are parliamentary committees; private stakeholders (business associations, labour unions, NGOs and relevant executive units. The project will:

- recommend capacity-building mechanisms which take into account the incentive structure of the main actors involved in making laws and regulations,
- recommend ways of enhancing the flow of information and
- disseminate this knowledge in the Arab region.

The kick-off workshop for this BMZ/GTZ-funded project took place in Cairo, Egypt, in June.

Persisting poverty and the need for providing and maintaining public services and infrastructure drive the rationale for decentralisation, which many governments now need. ZEF projects look at the obstacles to improving access to public goods and services.

4.6 Decentralisation and development

A number of important research questions stem at the same time from an economic and political-economy perspective regarding poverty effects of decentralisation. As a ZEF paper contributed to an IMF conference shows, political, administrative and fiscal decentralisation needs to be considered simultaneously, and the sequencing and pace of the different types of decentralisation appear to play an important role. For example, rural decentralisation will not benefit the rural poor if it isolates hinterland from urban and peri-urban growth centres. Neither will children in poverty enjoy any advantages from decentralisation if it undercuts the capacity of large-scale child nutrition programs. Results further suggest that political and administrative decentralisation should precede fiscal decentralisation, because otherwise participation and accountability are not assured.

Persisting poverty and the need to provide and maintain public services and infrastructure drive the rationale for decentralisation, which many governments now require. ZEF projects look at the obstacles to improving access to public goods and services. One of them analyses the provision of health and education in rural Russia, while a second project assesses the extent to which decentralisation helps in the delivery of public goods and services in Ghana.

Government building in Havana



Specific Research Areas

ZEF's more disciplinary research follows the contours of its three departments, as shown in Box 5.

Box 5: ZEF's Research Groups and Themes

Political and Cultural Change

Democratisation and the Rule of Law
 State Building and Ethnic Conflicts
 Human Rights and Development
 Culture and Development

Economic Development and Technological Change

Poverty Reduction, Human Resources, and Public Goods
 Trade and Aid Policies, Macroeconomic Issues, and Economic Roles of the State
 Technologies for Development and Efficiency in Resource Utilisation

Ecology and Natural Resource Utilisation

Atmosphere and Water Management
 Sustainable Land Use Systems
 Ecosystems in a Development Context

1. Department of Political and Cultural Change

Research in this department is most closely related to the cross-cutting theme of governance and governability. There are three research groups that enlarge and differentiate the crosscutting research on governance. They all ask about the role of a transforming state for sustainable development. The first group, State Building and Ethnic Conflict, aims at understanding the dominant form of violent political conflict over the past decades - a major obstacle to democratisation, the establishment of the rule of law and to development in general. A second group asks how the legal systems of states are responding to the human rights agenda and what effects their response may have on sustainable development. The third group on Culture, Knowledge and Development addresses how specific cultural traditions and systems of knowledge limit or enhance the prospects for democratisation, rule of law, and “good” governance.

1.1 State Building and Ethnic Conflict

Since the end of the Cold War ethnic conflicts have replaced interstate wars as major security threats. At the same time, ethnic violence is challenging the pillars of nation-states in many developing countries. ZEF's research group State Building and

Surviving in times
of war. Kabul,
Summer 2002.



Ethnic Conflicts concentrates on the relationship between government policies and the mobilisation of ethnicity along the following three lines. First, constraints of national development often lead to unequal access to state-controlled resources - the main reason for the politicisation of ethnicity in many developing states. Secondly, protracted ethnic conflicts undermine basic characteristics of modern statehood and especially the monopoly of violence by a single state administration. The increase of so-called 'failed states' that threaten neighbouring countries and even the international community illustrates this tendency. Attempts to settle conflicts - from dialogue projects to institutional arrangements for power-sharing - represent the third focus of this research group.

1.1.1 Nationalist exclusion and ethnic conflict

Nationalist and ethnic politics fundamentally shaped modernity. The modern state governs in the name of a people defined in ethnic and national terms. Where nation building was 'successful', immigrants and 'ethnic minorities' are excluded from full participation; they risk being targets of xenophobia and racism. In weaker states, political closure proceeds along ethnic, rather than national lines and leads to corresponding forms of conflict and violence.

In a recently published book, we show that nationalist and ethnic politics shaped modernity in a much more fundamental way than classic and contemporary social sciences have acknowledged. The modern state governs in the name of a people that was defined in ethnic and national terms. Democratic participation, equality before the law and protection from arbitrary violence were offered only to the ethnic group in a privileged relationship with the emerging nation-state. According to varying geometries of power, the dynamics of exclusion took on different forms. Where nation-building has been 'successful', immigrants and 'ethnic minorities' are excluded from full participation; they risk being targets of xenophobia and racism. In weaker states, political closure proceeded along ethnic rather than national lines, leading to corresponding forms of conflict and violence. In chapters on Mexico, Iraq and Switzerland, the book provides extended case studies that support and contextualise this argument.

1.1.2 Democracy, state and ethnic conflict in South Asia

The relationship between democracy, state and ethnic identities is also the main focus in a research project on South Asia that looks into the prospects and constraints of democratic development in multi-ethnic societies like Pakistan, Sri Lanka and Bangladesh. The experiences of South Asian countries illustrate that ethnic parties can act as important veto players who undermine the legitimacy of central governments and the state. Strengthening institutional arrangements to balance the demands of central governments vis à vis ethnic parties may be regarded as a key factor for state-building processes and democratic consolidation.

1.1.3 Constitutional draft for Burma/Myanmar

The constitutional constraints between minority claims, decentralist structures and the central government were analysed in Burma/Myanmar on behalf of the Friedrich Ebert Foundation and the exile government of Burma. The constitutional draft wrote down the entitlements of ethnic groups and tried to find a balance of power between the centre and the federal states. Critical points emphasised by ZEF include the definition of ethnic identities in the Burmese context and the question of how to deal with various minorities and their claims in the future.

1.1.4 Afghanistan – The ethnicisation of a conflict

The project on ethnic conflicts in Afghanistan was strongly influenced by the terrorist attacks of September 11 and the American intervention in Afghanistan. The political landscape of Afghanistan with its clans, villages, valleys and brotherhoods is much more deeply divided than the usual maps showing ethnic groups suggest. Therefore, ethnicity explains only one dimension of the conflict and was mainly instrumentalised by political leaders. In order to underline this argument, ZEF accentuated its research on other aspects of the conflict such as the erosion of state structures and on the dominance of warlordism and patronage systems in the past decades. The findings of the project have flown into a discussion paper on reconstruction and peace-building in Afghanistan. ZEF emphasises that the first aim should be to strengthen state structures and to foster the role of the state in reconstruction programs. The paper has been well received within the international development community and stimulated discussions on the future of Afghanistan and other 'failed' states. The Heinrich Böll Foundation has organised a workshop with representatives of all the major German development institutions in order to discuss the paper and its recommendations.

1.1.5 Beyond nationalism. Fostering peace and reconciliation between Yugoslavia's successor states

This project looks at the historical memories of the dissolution of Yugoslavia presented by academics in Bosnia, Croatia and Serbia. A series of workshops will be held in the region in order to stimulate a new, non-nationalistic view of the dissolution and to encourage teams of academics of different national backgrounds to write essays together. The output of the workshops will consist of a edited volume containing these essays which will be used in university curricula in the region, thus offering a contrasting interpretation to the dominant nationalistic vision of recent history. The project thus also hopes to contribute to conflict prevention in the region. It will be supported by the German Foreign Ministry and the American Social Science Research Council.

1.1.6 Pluralism in Southeast Asian Islam

Since September 11, Islam has been the focus of a renewed public discussion in the Western world. Whether Islam has an inherent tendency to produce political radicalism has been just one of the many lines of debate. In this project, ZEF takes a different perspective by showing that in Southeast Asian Islam, the tradition of accommodating religious and ethnic pluralisms has led to the rise of a much more differentiated and diversified political doctrine of Islam compared to the one in the Arab Peninsula. It would thus be mistaken to relate certain forms of Islamism to the characteristics of Islamic religious thinking as such. The project is financed by a fellowship for professorial candidates of the Deutsche Forschungsgemeinschaft.

In the framework of a project looking at the historical memories of the dissolution of Yugoslavia produced by academics in Bosnia, Croatia and Serbia, a series of workshops will be held in the region in order to stimulate a new, non-nationalistic view of the dissolution.

Pluralism in
South-East:
Asian Islam



1.2 Human Rights

Human rights have become the centrepiece of development policy statements from both governments and non-governmental organisations around the world. A scholarly assessment of the factors that facilitate or hinder the actual implementation of human rights in various political and cultural settings is the focus of this research group. The projects accordingly reflect a comparative and empirical approach.

1.2.1 Legal risks management of multinationals in developing countries

The project on “Human Rights in a Globalizing Economy: Legal Risks Management of Multinationals in Developing Countries” is intended to examine the interrelation between legal and economic processes of globalisation by looking at the human rights strategies of multinational corporations. In a collaborative effort between the Centre for Sociological Studies, Wolfson College, Oxford University and ZEF, a research proposal has been submitted to the Volkswagen Foundation. A comparative study of two multinational corporations in the extractive industry (oil and gold) and their operations in the Caspian Sea, China, Indonesia, Peru and Tanzania will reveal the internal and external factors explaining different strategies adopted for dealing with human rights risks, from ignoring the risks to adopting an explicit fostering of human rights.

1.2.2 Role of court administrators and law adjudicators in assuring access to justice

This project looks at another actor for implementing human rights: the courts. Justice reform has recently become a popular topic. As a result, the focus has been on institutional infrastructure for realising justice. In an edited volume, an effort has been made to extend existing knowledge on realising justice in various cultural contexts. The book represents a rare combination of interdisciplinary contributions from academia and legal practitioners in developing countries and one ex-colonising country. The examples from the UK, Burundi, Ghana, Tanzania, South Africa, and Sudan point out the need to recognise that each culture has its own sense of rule of law and its own institutional framework for accessing tribunals. In most country studies, non-lawyer support personnel are key figures in providing access to justice. This book makes an important contribution to identifying basic elements that are currently being overlooked in judicial reform schemes where the training of non-lawyer support personnel should be given priority over, or at least the same priority as, the training of lawyers.

1.3 Culture, Knowledge and Development

Culture and knowledge have come to the forefront of the global development debate in recent years. The working group looks at the interface between local and global knowledge during the implementation of development strategies. By studying how civil servants, experts and consultants absorb and apply experience and knowledge, the working group hopes to provide practical solutions for the management of knowledge in trans-cultural situations.

1.3.1 Globalisation of knowledge

ZEF research shows that instead of translating concepts into practice, experts tend to construct virtual worlds of development and underdevelopment through extensive report writing. Networking and exchange of knowledge among development experts is much more limited than commonly assumed and is mostly confined within national organisational boundaries.

Instead of translating concepts into practice, experts tend to construct virtual worlds of development and underdevelopment through extensive report writing. Networking and exchange of knowledge among development experts is mostly confined within national organisational boundaries.

Prof. Evers (ZEFa) and participants of a course on Knowledge Management organized in Singapore by the Commonwealth Secretariat



While globalisation is known and experienced, in many cases, it is not transposed into concerted action. Networks are often controlled by “gate-keepers” who reduce the flow of information and knowledge. And local experts tend to fall in line with global trends instead of utilising their local knowledge. In the reporting period field studies on the role and impact of development experts were carried out in Germany, Indonesia, Kazakhstan, Uzbekistan, Nepal and the Philippines. The field data confirm earlier results that basic development strategies and concepts originate from university departments and research institutes but are “authorised” by major development organisations led by the World Bank.

Related to this project, which is being funded by the Deutsche Forschungsgemeinschaft and run jointly with the Institute for Global Society Studies at the University of Bielefeld, an evaluation study on “Securing Professional Competence in German Development Cooperation” was carried out for the German Federal Ministry of Economic Cooperation and Development (BMZ) and completed in 2001. Interviews with government officials and development experts were conducted in several European, African, Asian and Latin American countries, and the practices of other national and international development organisations were analysed.

1.3.2 Knowledge management

Another research project, which is funded by a grant from the Management University of Singapore (SMU), is concerned with knowledge management in large organisations and firms. Results of a survey of consulting firms in Singapore have been published as a working paper. Research along these lines is further pursued in a study comparing knowledge management practices in Singaporean and German firms. Preparations for an intensive course on Knowledge Management under the auspices of the Commonwealth Secretariat have been completed.

1.3.3 Knowledge society

This project, which was conducted in co-operation with the National University of Malaysia’s Institute of Malaysian and International Studies (IKMAS), focuses on a comparative macro-analysis of Malaysia, Indonesia and Korea on the path towards a knowledge society. The study shows that Malaysia has pursued a very active policy of developing an infrastructure for high-tech industries. Whereas this country was rapidly catching up with Korea in the 1980s, investment in Research and Development and the training of related personnel has declined in the wake of the 1997 monetary crisis. Work on Indonesia and other ASEAN countries is being continued.

A ZEF project focusing on a comparative macro-analysis on Malaysia, Indonesia and Korea on the path towards a knowledge society shows that Malaysia has pursued a very active policy of developing an infrastructure for high-tech industries.

2. Department of Economics and Technological Change

Research topics at the Department of Economics and Technological Change derive from the notion that sustainable development serving human welfare faces two major types of constraints. One is the natural environment and available technologies, and the other is economic and political constraints, including institutions, policies, and legal frameworks at the international, national, and local levels. Therefore, research in this department is focused on poverty reduction, trade and governance, as well as on development-enhancing technology utilisation and natural resource management.

Food insecurity and poverty nexus



2.1 Poverty Reduction

Poverty is widespread in many developing countries. Especially in rural areas, people often live in poor conditions, suffering poor health and malnutrition or being constrained by limited access to resources. ZEF's multi-disciplinary research on social security and health insurance has been highlighted before. The Center's further poverty-related research places emphasis on nutrition, child labour and volunteering and poverty is also addressed in the context of macro- and trade policy research.

2.1.1 An international nutrition index for analysing food insecurity and undernutrition

An international Nutrition Index (NI) has been developed to create a comprehensive measure of food security and nutrition. The NI is composed of the percentage of undernourished in the population, the prevalence of underweight in children and the under-five-mortality rate. After data refinement and estimation procedures, data availability permitted NI calculation for 97 developing countries and nine transition countries for the years 1981, 1992 and 1997. In addition, subnationally disaggregated NI values were computed for China and India. Rank correlation analyses showed that the NI adds most to the information contained in its components, GNP per capita and the Human Development Index (HDI) if subgroups of the full country data set are considered. Compared to its components, the NI performed well in terms of correlations with indicators of micronutrient deficiencies, which could not be included in the index due to scanty data availability. The NI showed sensitivity to inequality and significantly higher rank correlations with four international measures of absolute poverty than GNP per capita and the HDI. A regression analysis revealed that the logarithm of GNP per capita accounted for 74 % of NI variation. The coefficient of determination is raised to about 88 % by entering political and social indicators as additional explanatory variables. The NI tends to rise with increasing urbanisation, immunisation rates of children and utilisation of adequate obstetric care. High levels of military expenditure and engagement of countries in wars could be shown to have a detrimental effect on food security and nutrition, even apart from their potentially negative consequences for macro-economic performance. The NI has been discussed and made available at international fora such as the IFPRI 2020 Conference (2001) and the UN Committee on Nutrition (2002).

An international Nutrition Index (NI) has been developed to create a comprehensive measure of food security and nutrition. The NI is composed of the percentage of undernourished in the population, the prevalence of underweight in children and the under-five-mortality rate.

2.1.2 Schooling or work? The determinants of child labour in Africa

Child labour of the exploitative type must be overcome fast. Economic and legal action is needed. Empirical evidence indicates that child labourers are found mostly in developing countries and are employed mainly in agriculture and related activities. In many developing countries, the contribution of children to family income has been found to play a consistently significant role. A ZEF study examined how subsistence-rural households decided to allow their children to spend time on competing activities, including work and school attendance. The results show that a number of child- and household-specific attributes, culture- and location-specific factors as well as economic factors related to household wealth and technological development affect the decision-making process. Improving the educational infrastructure, encouraging technological adoption and creating a more stable economic base for rural households could significantly contribute towards reducing the problem of child labour.

2.1.3 Economics of volunteering – A cross-country investigation

ZEF research draws attention to the key rules for development of institutions that operate in the sphere between state and market. The project “Volume and Economic Value of Volunteering in Countries of Different Income Levels” was launched in June 2000 as a joint initiative with the United Nations Volunteers. Bangladesh, Ghana, Poland and South Korea have been selected for theoretical and empirical research on the determinants of volunteering and the analysis of the economic significance of volunteer labour supply. A common methodology and survey design were employed in each country in order to enable cross-country comparisons. Initial results on the volume and economic value of volunteer work were obtained as a contribution to the ‘International Year of the Volunteer 2001’. Findings revealed that the share of volunteers in the total population who are engaged in regular volunteer work within an institution of the Non-profit Sector increases with the level of economic development of the country, ranging between 0.43 % of the population in Bangladesh and 5.47 % in South Korea. The profile of volunteers also revealed considerable variations across the countries, reflecting, for example, that far fewer women compared to men are engaged in volunteer work in Bangladesh and Ghana. In contrast, female volunteers outweigh their male counterparts in Poland and South Korea. Volunteers in Bangladesh and Ghana also showed a higher frequency of volunteering, with many of them involved daily.

ZEF research shows that the profile of volunteers varies considerably across countries. For instance, far fewer women compared to men are engaged in volunteer work in Bangladesh and Ghana, while female volunteers outweigh their male counterparts in Poland and South Korea.

2.2 Trade and Macroeconomic Issues of Development

Trade liberalisation and macroeconomic reforms confront developing countries with new challenges. To support these countries in meeting the challenges, ZEF’s research concentrates on the impact of Foreign Direct Investment (FDI) policies and international trade and aid on the development of low-income countries, and on mechanisms of global governance, including social and environmental standards. Three research areas have been selected and will be presented in the following.

Working children at a market in Ghana



2.2.1 Investment perspectives of ACP countries and selected Asian countries

Support for the private sector and investment is one of the priorities under the Cotonou Agreement. The Agreement could increase incentives for private investment in the African, Caribbean and Pacific (ACP) countries either through direct support measures (e.g. the new investment guarantees) or, more indirectly, through complementary spending for infrastructure and administration and, not least, through secured access to the European market. Empirical findings in the context of ZEF's project on the future of EU-ACP relations show that total aid has a positive but declining effect on the share of gross domestic investment in GDP. The effect of aid from the European Commission on gross domestic investment in developing countries seems to be smaller, partly due to its allocation towards ACP countries with a relatively poor investment performance. Further research in this area intends to analyse determinants and effects of FDI in different sectors and to identify factors that encourage linkages between FDI and domestic firms as well as mechanisms of knowledge and technology transfers in selected ACP countries.

Two other ZEF projects look at the impact of FDI on growth and poverty reduction in Vietnam and on gender-differentiated employment and equity effects of FDI in rural Indonesia.

2.2.2 Research on transition countries and transitions of developing countries

A lot of attention is given to research on transition countries, particularly those in the Former Soviet Union (FSU). Various aspects have been studied mostly from an economy-wide perspective. First, the economic effects of the increasing number of inter-regional trade agreements have been analysed. Second, the option of multi-lateral trade liberalisation in the framework of the World Trade Organization (WTO) has been studied. While some smaller countries of the FSU have already joined the WTO (i.e. Kyrgyzstan, Georgia, and Moldova), the major countries are still negotiating over the terms of their accession. The analysis of Russia's WTO accession has been based on an economy-wide computable general equilibrium model that was tailored to capture some typical features of Russia's economy in transition. Third, inter-regional trade barriers and the role of transaction costs was analysed in a study assessing trade costs for agricultural commodities within Russia empirically.

A second strand of the studies on transition countries relates to the economic effects of the transition process on rural areas. This includes research on the role of subsistence farming, the effects of decentralisation on the provision of social services and the restructuring of land and water use in Uzbekistan.

ZEF research on transition countries shows that rural labour markets there are highly distorted. As wages from agricultural labour are often the main source of income in rural areas, it is necessary to determine the existing rigidities and to fully understand how rural labour markets work in order to assess their impact on household welfare and poverty.

Donkey and tractor,
Uzbekistan



Rural labour markets are highly distorted, and their efficiency depends on appropriate natural resource management. As wages from agricultural labour are often the main source of income in rural areas, it is necessary to determine the existing rigidities and to fully understand how rural labour markets work in order to assess their impact on household welfare and poverty. Although they are further advanced, many Central and Eastern European (CEE) countries seem to show similar patterns of economic transition to those of developing countries. Can we learn from the transition experiences of CEE economies and draw lessons for developing countries and vice versa? This ZEF project, which is funded by the Robert Bosch Foundation, Stuttgart, compares the linkages between rural labour markets, natural resource management and poverty in Romania with Tanzania. Ultimately, overall economic growth critically depends on the functioning of (factor) markets and their agents, which suggests the application of a multi-sector economy-wide modelling framework that features macro, mezzo, and micro elements and allows the integration of bio-economic modelling components for our particular purposes. ZEF plays a pioneering role in this field of research.

2.2.3 Environmental, food safety and social standards in the context of WTO

The collapse of trade negotiations in Seattle in December 1999 and the Ministerial Declaration of Doha have brought the debate on social and environmental standards as well as food safety issues to the forefront of post-Uruguay Round multilateral trade talks. There are major frictions of different country groups under the World Trade Organization (WTO). Research at ZEF sheds light on the relevant WTO agreements dealing with technical as well as sanitary and phytosanitary standards and potential outcomes of setting standards. A list of alternative policy responses and strategies to tackle environmental issues in the context of international trade is proposed that includes eco-labelling and other labelling schemes, reducing subsidies, multi-lateral environmental agreements, or technical assistance, and mutual recognition of equivalent standards. In addition, broader issues related to the demand for including minimum labour standards in the form of a social clause in the WTO have been reviewed, and the impact of social labelling has been analysed. Furthermore, ZEF research has looked at the issue of how to integrate the interests of developing countries more effectively into the new development round.

2.3 Efficiency in Resource Utilisation and Technologies for Development

At ZEF, special attention is paid to the four natural resources forests, water, land and biodiversity as well as the institutional perspective of natural resource management (NRM). The efficiency of NRM in turn also depends on new technologies like information and communication technology (ICT) and biotechnology, which are included in ZEF's research agenda too.

2.3.1 Management of tropical forests

Stabilisation of forest margin areas through poverty alleviation can contribute to lowering the pressure on forest areas. Technical and institutional progress and new policies offer means to increase productivity and to improve smallholder livelihoods. ZEF's research project on "Smallholders in the Eastern Amazon: Interactions between eco-system and social system in the management of tropical forests" is co-funded by the German Federal Ministry of Education and Research (BMBF) as part of the bilateral SHIFT (Studies on Human Impact on Forests and Floodplains in the Tropics) project. It evaluates agricultural innovations for smallholders operating in

ZEF's research on smallholders in the Eastern Amazon evaluates agricultural innovations for smallholders operating in fallow systems in the region. The evaluation includes a bio-economic modelling approach to quantify land use decisions under different policy scenarios and a comparative analysis to assess the significance of the results for other areas in the Amazon.

fallow systems in the Eastern Amazon. The evaluation includes a private and social cost benefit analysis, a bio-economic modelling approach to quantify land use decisions under different policy scenarios, an analysis of institutions relevant to technology diffusion and a comparative analysis to assess the significance of the results for other areas in the Amazon.

2.3.2 Water safety and security issues

Changes in water supply and demand in the Volta basin as well as the hydrological and socio-economic trade-offs in water allocation are being examined in the context of the GLOWA-Volta project. Based on ten-year average data and an institutional analysis of the water sector, alternative water management scenarios have been developed and assessed in initial runs of an integrated economic-hydrologic optimisation model. Initial results suggest that the effect of increased irrigation development is small compared to rainfall and runoff variability in the Volta basin. Secondary data analysis showed that only around 40 % of rural households and about 50 % of urban households use improved water sources for their drinking water needs. A household's choice between improved and traditional drinking water sources not only depends on the household's income level and distance to the source but is also determined by other factors such as education, preferences or taste. Mapping of water-related diseases, moreover, underlines the importance of health effects through water use.



GLOWA-Volta project

A PhD research project was finalised in 2001 looking at the “Economics of Household Water Security in Jordan”. The objective of this research was a better understanding of household access, demand and usage of water over space and time and the assessment of effective water prices paid by poor households. This research forms a pilot study of ZEF research on Water and Poverty, which will be continued and extended within the GLOWA-Volta framework.

2.3.3 Sustainable land use in Uganda

A ZEF project conducted in co-operation with the International Food Policy Research Institute (IFPRI) integrates biophysical and socio-economic approaches to identify suitable incentives for enhancing sustainable land use in Uganda. Bioeconomic modelling work within a multiple-agent framework is being conducted at two sites representing different development pathways: one site in the coffee-banana-maize system of central Uganda, and the other in the maize-dominated system in the highlands of eastern Uganda.

2.3.4 Institutions and natural resource management

Many developing countries are currently devolving rights and responsibilities over natural resource management from the state to local communities. It has been argued that local communities are better suited than national governments to manage local natural resources because they have better information on local conditions, the capacity to adapt to changes in these conditions more easily, a higher stake in successful management, and lower monitoring costs. However, an effective management of natural resources through local communities also requires the co-operation of heterogeneous community members or subgroups and can be hampered by local hierarchies and different ethnicities or simply by differences in interests and negotiating power between groups of users. Devolution may thus lead to rent-seeking activi-

It has been argued that local communities are better suited than national governments to manage local natural resources. ZEF has set up a research group aiming at a better understanding of the factors leading to the success or failure of such approaches.

ties by the more powerful and prevent the state from exercising an important role in assuring the inclusion of marginalised groups. The empirical evidence on the outcomes of community natural resource management is mixed. In April 2001, ZEF began setting up a new research group aiming at a better understanding of the factors leading to the success or failure of such approaches. Studies are being carried out on a variety of resources and countries: irrigation management in Ghana and Sri Lanka, and forest management in Indonesia, India and Vietnam. This research is facilitated by the Robert Bosch Foundation's Junior Research Group Leader program and is conducted in interdisciplinary co-operation with a variety of local partner organisations, international research institutes and existing ZEF projects.



Participants discussing at the workshop on community-based irrigation management in Northern Ghana, May 2002.

2.3.5 Biodiversity

Based on a rapid change of production systems, an uncontrolled loss of endemic plant genetic resources for food and agriculture (PGRFA) could take place. So far, genetic extinction has occurred mainly in the form of traditional varieties being replaced in main production areas. Hence, the last resort for the majority of traditional varieties is the ecological and economic marginal areas. Besides the ex situ conservation of PGRFA in gene banks and other conservation facilities, on-farm management of farmers' varieties is increasingly accepted as an important contribution to maintaining diversity richness world-wide. However, the costs for the farmers and countries maintaining agrobiodiversity on-farm are seldom reflected. Hence, instruments and mechanisms encouraging farmers to ensure the future existence of PGRFA diversity have to reflect the national objectives of overall food security as well. As part of the EU-funded BioECON project, a research project at ZEF is concentrating on the analysis and development of institutional approaches to maintain agrobiodiversity at farm level. The objective of the research, some of which is being conducted in Ethiopia, is to develop on-farm management systems that are effective, flexible, and reliable and at the same time secure the long-term food availability and income situation of marginalised farmers.

2.3.6 The Global Register of Migratory Species (GROMS)

Two books and a CD-ROM database on animal migration have now been released as a result of the project "Global Register of Migratory Species" published by the Federal Agency of Nature Conservation, with funds from the German Federal Ministry of the Environment. One book, "The Global Register of Migratory Species - Database, GIS Maps and Threat", contains a CD with the entire database, full text documents and GIS maps. The database refers to 2,880 migratory vertebrate species and their common names in English, French and Spanish, their threat status according to the International Red List 2000, an extensive bibliography of 4,300 references, and digital maps for 545 species. Maps are compatible with any Geographical Information System (GIS), which allows geographic queries and threat analysis by intersection with other GIS layers. A simplified version of the database is available at <http://www.groms.de>. The second book, entitled "New Perspectives for Monitoring Migratory Animals - Improving Knowledge for Conservation", contains the proceedings of a workshop hosted by ZEF on the occasion of the 20th anniversary of the Convention on the Conservation of Migratory Species of Wild Animals. Several conservation programs for threatened migratory species are presented here and illustrate the great potential new technologies have for an improvement of such programs.

Two books on animal migration, "The Global Register of Migratory Species - Database, GIS Maps and Threat", and "New Perspectives for Monitoring Migratory Animals - Improving Knowledge for Conservation", have now been released as a result of the project "Global Register of Migratory Species".



3. Department of Ecology and Natural Resource Management

The depletion of raw materials, shifts in material and energy flows, degradation of biodiversity, and landscape changes are exerting a critical strain on the global environment. Understanding these changes is not only a major challenge for science, but also a prerequisite for designing policies and actions to alter the course of events or temper their effects.

Within ZEF's terrestrial ecosystem research program, change processes require attention in two areas: at the ecosystem edge where land conversion is taking place in areas such as forest margins, wetland margins, and desert margins, and in areas where land-use practices are leading to land degradation, and ultimately to the need for new land. The principal units of analysis range from plot to watershed level.

An important aim of an integrated landscape analysis involving all components (soil, air, water, plants, animals and human use) is the valuation of services provided by natural ecosystem components. These special ecosystem values must also be put in the context of agricultural productivity and trade (or substitution) options, particularly when societal resources are called upon to improve sustainability or preserve ecosystem function.

ZEF's terrestrial ecosystem research program focuses on change processes in two areas: at the ecosystem edge where land conversion is taking place, such as forest and desert margins, and in areas where land-use practices are leading to land degradation.

3.1 Atmosphere and Water Management

3.1.1 Carbon cycling and greenhouse gas emissions

Human-induced changes in natural systems or land use have a direct impact on the atmosphere. Processes such as emissions of CO₂, methane and nitrous oxide from soils or from biomass burning remain poorly understood.

Wetlands store a huge amount of carbon in the soil and cover vast areas worldwide. Their destruction would lead to an additional input of CO₂ into the atmosphere. Wetlands are also important centres of diversity for both flora and fauna and regulate the water balance in the landscape. Sound concepts for a wise use of wetlands are needed to comply both with the Ramsar Convention in favour of nature conservation and the UN Framework Convention on Climate Change to forestall emission of greenhouse gases.

ZEF is working towards a better understanding of land-use change in wetlands as well as development options that offer environmentally and economically viable alternatives. It has therefore elaborated a new research program on wetland development. An initial study compiles a global inventory of wetlands and their carbon pools based on vegetation and soil maps. This inventory will assist in identifying the stocks of soil organic carbon and their density distributions in the global wetlands and thus the hotspots of potential greenhouse gas (GHG) emissions under ongoing development.

The global inventory is supplemented by in-depth studies on land-use change on regional scales. One case study on wetlands in the Lake Victoria Basin has been initiated in collaboration with the International Centre for Research in Agroforestry (ICRAF). Carbon dioxide emissions involved in land use change will be quantified in two steps: first by an analysis of remote sensing images and then by a characterisa-

tion of landscape elements and their respective carbon pools in vegetation and soils for extrapolation. Another PhD project will view different development scenarios of the wetlands in the Mekong River Basin.

The Kyoto Protocol introduced new mechanisms to finance the mitigation of GHG emissions in developing countries. Production from tropical agricultural systems will need to increase, to meet the rising demands of an increasing human population together with changes in consumption patterns over coming decades. Intensification and/or extensification of agricultural production using conventional technologies may, in turn, increase GHG production.

To address the issue of mitigating GHG emission, ZEF and the Fraunhofer Institute for Atmospheric Environmental Research jointly organised an international workshop, which was held in Bonn from Nov. 9-11 2001. The workshop, entitled “Tropical Agriculture in Transition - Opportunities for Mitigating Greenhouse Gas Emissions?”, was attended by 50 scientists from 14 countries.

The participants agreed that the prevention of deforestation - the prime source of GHG - and the re-forestation of degraded land should have priority in national climate protection programs of developing countries. Furthermore, it was pointed out that future research has to include participation of stakeholders from all conceivable levels, i.e. farmers’ co-operatives, non-governmental organisations, national agricultural research centres and extension services, to devise simple and financially interesting incentives for reducing emissions. The feasibility of environmentally-friendly production techniques has to be disseminated to the public through ‘success stories’ documented in public media and on special demonstration farms.

3.1.2 Water scarcity and resource management

ZEF tackles the issue of water management at several points. It assesses the functioning of the water cycle at a watershed level as affected by land cover, analyses the ecological functions of water vis-à-vis its productive role and monitors the effect of water utilisation on its quality and potential downstream re-use. ZEF’s interdisciplinary, core program in this regard, the GLOWA-Volta Project on “Sustainable Water Use under Changing Land Use, Rainfall Reliability, and Water Demands in the Volta Basin”, is already in an advanced stage of development. It is described in detail in a previous section.

To address the issue of mitigation of greenhouse gas emission, ZEF and the Fraunhofer Institute for Atmospheric Environmental Research jointly organised an international workshop in 2001 that was attended by 50 scientists from 14 countries.



Drought, GLOWA-Volta project



The ultimate goal of improved water management is to enhance human welfare in a manner that is sustainable and does not damage the environment. Water resources for agriculture in Asia are becoming increasingly scarce, and ways must be sought to optimise the use and efficiency of irrigation systems. More than 75 % of the world's rice supply comes from 79 million ha of irrigated land in Asia. Irrigated agriculture accounts for 90 % of total diverted freshwater, and more than 50 % of this is used to irrigate rice in Asia. However, irrigated rice is a heavy consumer of water: it takes some 5,000 litres of water to produce a single kilogram of rice. More than half the water consumed in rice production is used to prepare the land, and most of this is lost in the process through non-beneficial use of evapotranspiration, seepage and percolation. There is an urgent need to develop management policies for efficient operation of irrigation systems, technologies that reduce water consumption, changes in rice crop management to increase water productivity and provide economic incentives to farmers to reduce water losses. ZEF is tackling this issue in a project on "Water Accounting and Productivity at Different Spatial Scales in a Rice Irrigation System; A Remote Sensing Approach". The objectives of this study, which is being conducted at the International Rice Research Institute (IRRI) in the Philippines, are:

- to estimate actual evapotranspiration using different public sensors like Landsat 7 ETM+, TERRA/ASTER and TERRA/MODIS data at different spatial and temporal scales within the district of the Upper Pumpanga River Integrated Irrigation System (UPRIIS) Philippines,
- to develop methods for evaluating water use efficiency at 6 different spatial scales in the system and
- to measure water productivity at 6 different scales within District 1 of UPRIIS.

UPRIIS covers roughly 25,000 ha and is bounded by the Talavera and Ilog Baliwag rivers on both sides. The most common land use in this district is double cropping of rice through the transplanting method. The climate in UPRIIS is characterised by two pronounced seasons, a dry one from November to April with an average rainfall of 170 mm and a wet one from May to October with an average rainfall of 1,730 mm. The water balance for an irrigation project is a complex set of inflows, outflows, consumptive use, and recycling of water. This is why 200 points were monitored twice for measuring inflow and outflow at different scales from the irrigation system for two cropping seasons in 2000 and 2001. A comprehensive field campaign was carried out to measure re-use of water from groundwater, creeks, seepage and percolation along different soils, involving groundwater table monitoring, setting up a network of rain gauges and a social survey of 60 farmers in the district. Water balancing is calculated at six different spatial scale levels to test the hypothesis that water-use efficiency and productivity increases with increasing scale level because of increasing options for water re-use.

The ways in which soil, nutrient, or organic matter losses occur, and the mechanisms involved in restoring these losses, need to be understood if sound policies are to be devised to maintain soil fertility. ZEF projects can lead to management options that avoid or reverse them.

3.2 Sustainable Land Use System

ZEF's research includes the global issues of soil degradation, soil erosion, and broken nutrient cycles linked to development processes. These problems and their cause-and-effect relationships are often regional in character. The ways in which soil, nutrient, or organic matter losses occur, and the mechanisms involved in restoring these losses, need to be understood if sound policies are to be devised to maintain the soil fertility. Here, ZEF's projects seek to increase understanding of degradation processes and aim at management options that avoid or reverse them.

3.2.1 Impact of land use and management on soil erosion

One of ZEF's interdisciplinary, core research projects dealing with these issues is located in Uzbekistan. "Economic and Ecological Restructuring of Land and Water Use in the Khorezm Region (Uzbekistan): A Pilot Project in Development Research" is described in detail in a previous section.

The second interdisciplinary project deals with the "Policies for Improved Land Management in Uganda". The long-term goal of this project is to contribute to improved land management in Uganda in order to increase agricultural productivity, reduce poverty, and ensure sustainable use of natural resources. The immediate purpose is to help policy-makers identify and assess policy and institutional and technological strategies to improve land management in Uganda.



The Minister of Agriculture and Water Management of the Republic of Uzbekistan at his inaugural speech of the Uzbekistan Project in Taschkent, May 2002.

The contribution of the department 'Ecology and Resource Management' includes:

- the stratification of land management domains throughout Uganda using geographical information system (GIS),
- an assessment of nutrient balance and various technological options for sustainable land use,
- the development of site-specific land management strategy utilising a deterministic erosion model,
- the application of radio-nuclide techniques (Cs-137 and Pb-210) to assess long-term soil degradation in Uganda and
- the development of the crop growth model (DSSAT) and Artificial Neural Network (ANN) crop simulator to assess the influence of various technological options on potential crop yield.

The integration of all these methodologies for a more sustainable landscape-based resource management is currently under investigation.

The stratification of land management domains was performed at the beginning of the project. This stratification procedure combines the potential for market access, population density, and the agricultural potential to delineate spatial domains of land management over Uganda as a whole. Its output provided the main selection criteria for subsequent market, community, household and plot surveys. During the field survey in 2000 and 2001, the mapping of natural resources and soil surveys were also conducted to identify a large-scale natural resource distribution pattern throughout Uganda.

Detailed surveys were carried out in seven districts of Eastern Uganda to estimate nutrient balances at farm level. Comprehensive natural processes and farming activities were included in the calculation of the nutrient balance. It turned out that the balances were negative for all nutrients across the sites covered. The major avenues of nutrient losses are through marketing of crops and soil erosion. On-farm research was conducted at four sites each among 14 to 17 randomly selected farmers in Eastern Uganda to evaluate the potential of various agronomic techniques to improve maize and rice production in the region. In addition to examining various technological options for resource-poor farmers in Eastern Uganda, the most suitable strate-

Detailed surveys were carried out in seven districts of Eastern Uganda to estimate nutrient balances at the farm level. It turned out that the balances were negative for all nutrients across the sites covered.



gy for soil fertility maintenance was also assessed during this research. It could be shown that farmers do better to invest the resources for soil fertility replenishment in areas with productive soils because of their higher economic benefit.

It is widely believed that different land management techniques are required for each slope section due to natural variability of soil properties and erosion potentials along the slope. The Water Erosion Prediction Project (WEPP model) was applied to evaluate the effect of land management methods on soil erosion. This research aims to quantify the influence of different types of land management on a hillslope. A detailed soil survey and participatory hillslope mapping were also used to identify natural changes in soil properties. The constructed model shows that soil conservation techniques such as residue management and contouring may reduce the risk of soil erosion by up to 70 % on steep slope sections compared to presently used tillage practices at the research site.

As part of nutrient balance and soil degradation studies, Cs-137 and Pb-210 techniques were applied to characterise the long-term erosion rate under different environmental and land use conditions. During the last two decades, the efficiency and the value of the Cs-137 were increasingly recognised to estimate spatially distributed mid-term (10-30 years) soil erosion rates. However, the application of this technique under tropical conditions has been limited because the amount of radio-nuclide fallout is low due to atmospheric circulation. Two study sites in Eastern Uganda show that the level of Cs-137 is indeed low (2-3 Bq kg⁻¹ with a 10 % measurement error), but that it still opens the possibility to utilise these techniques for soil degradation studies in the tropics.

The influence of possible technological options for future crop yields has been modelled using two different approaches; a deterministic crop simulation model (DSSAT) and an adaptive modelling framework utilising Artificial Neural Networks (ANN). These two model structures are based on entirely different theories and logical concepts, but complement each other for the given purposes. The calibrated models were used for the bioeconomic modelling approaches and will be successively utilised for a further integration of individual research components.

3.2.2 Nutrient-enhancing mechanisms

One of ZEF's focal research projects is the improvement of nitrogen (N) use efficiency in rice cropping systems in Southeast Asia by integration of the floating water fern *Azolla*. In association with a blue-green algae (*Anabaena*), this fern provides considerable amounts of atmospheric nitrogen to the system.

In a Ph.D. study, finished in June 2002, and carried out in collaboration with the Philippine Rice Research Institute (PhilRice) in Los Baños during the dry season of 1998-99, the use of *Azolla* to reduce ammonia (NH₃) volatilisation and improve the low N use efficiency of applied urea in lowland rice fields was evaluated for 3 cropping seasons. The *Azolla* cover approach was further investigated and verified in farmers' fields during the wet and dry seasons of 2000-2001. Findings revealed that a full *Azolla* cover on the floodwater surface at the time of urea application prevented the rapid and large increase in floodwater pH associated with urea hydrolysis and the photosynthetic activities of the algae. In the presence of an *Azolla* cover, the mean floodwater pH was reduced by as much as 1.9 pH units, and the maximum pH value was kept below 8.3. In contrast, in the absence of a cover, floodwater pH rose above 8.5 and reached a maximum of 10.1. The floodwater temperature was

A ZEF project in Southeast Asia focuses on the improvement of nitrogen (N) use efficiency in rice cropping systems by integration of the floating water fern *Azolla*. In association with a blue-green algae, this fern provides considerable amounts of nitrogen to the system.

lowered by as much as 5°C. As a consequence, the partial pressure of NH₃, which is an indicator of potential N volatilisation, was significantly depressed. The total N uptake increased by as much as 42 % and the total dry matter yield by as much as 36 % on Azolla-covered plots. The grain yield was likewise improved. Grain yields from the 16 on-farm trials increased by as much as 40% at lower N rates (40 and 50 kg N ha⁻¹) and still by 19 % at higher N rates (80 and 100 kg N ha⁻¹).

Thus, using Azolla as a surface cover in combination with urea can be an alternative management practice to reduce N losses and improve N-use efficiency, and is worth considering.

3.2.3 Management of soil ecology

Within the bilateral German-Brazilian SHIFT Project on the “Management of plant organic matter and its effects on litter decomposition and soil macrofauna in central Amazonian agroecosystems”, ZEF is studying the effects of the management of plant debris in agricultural systems on soil fauna and nutrient cycling. As one of the most important soil fauna groups, termites play a central role in these systems. The study consists of field experiments, experiments in microcosms, a screening of different decomposition systems and experiments on ecotoxicology. The field experiments comprise three experiments on the manipulation of litter quantity and quality and an experiment on mulching with wood residues.

3.3 Ecosystems in a Development Context

Uncontrolled exploitation of natural resources has led and will continue to lead to the irreversible loss of valuable and unique natural resources. There is general international consensus on using natural resources wisely and in a sustainable manner. However, poverty and market mechanisms still favour unsustainable resource exploitation. It is rather difficult to calculate economic values for natural resources, especially for “service functions” and biodiversity. There is an urgent need to design appropriate policies and to explore incentive mechanisms that would favour sustainable use of resources.

ZEF pursues projects that provide a better insight into the principles of ecosystem functioning. Some of these projects are already mentioned in the previous chapter on sustainable land use systems (Uzbekistan and Uganda Project), as these two research themes do overlap to a large extent by their very nature. The bilateral German-Brazilian SHIFT project “Secondary Forests and Fallow Vegetation in the Agricultural Landscape of the Eastern Amazon Region, Brazil” as well as the associated SHIFT project “Smallholders in the Amazon: Interaction between Ecosystem and Social Systems in the Utilization and Protection of Tropical Rainforests” deal with human impact on ecosystems and are focusing on concepts for using natural resources in a sustainable manner. Details are given in a previous section of this report.

Uncontrolled exploitation of natural resources has led to the irreversible loss of valuable and unique natural resources. There is an urgent need to design appropriate policies and to explore incentive mechanisms that would favour sustainable use of resources.



Three new „Doctors“

ZEF's International Doctoral Program offers doctoral degrees for young scientists engaged in policy analysis, economics, social sciences and management of natural resources. The students usually join a research group to ensure an adequate training environment.

Teaching

1. The International Doctoral Program for Development Studies

ZEF's International Doctoral Program offers doctoral degrees of a top academic standard for young scientists engaged in policy analysis, economics, social sciences and management of natural resources. To ensure an adequate training environment and an overall coherence within ZEF, the students are usually part of one of the research groups. The Doctoral Program reflects the principal domains of ZEF's research activities, but in addition, doctoral research stimulates and advances ZEF's research agenda.

Currently, 94 students from 32 countries, mainly from Africa and Asia, are in the International Doctoral Program at ZEF. One third are women. In 2001, more than 1,300 persons from all over the world had requested information on the program. In the end, we received around 320 new applications, many of them from applicants with an outstanding track record. Out of these, 30 candidates were selected on the basis of applicant quality criteria, experience and their research proposal to participate in the academic year 2001/02.

A considerable effort is undertaken to present the Doctoral Program and the research of the participating students on the ZEF homepage, because the Internet plays an important role in distributing information on the program. The majority of the persons interested first heard of the program from the ZEF homepage or through e-mails distributed world-wide to universities and other institutions.

2. Scholarships and Funding

In 2001, around 40 % of the participants received scholarships from the DAAD (German Academic Exchange Service - only for students from developing countries). The rest were supported by the Robert Bosch Foundation (for German and EU citizens), the Catholic Academic Foreign Service (Katholischer Akademischer Ausländerdienst, KAAD), Ecumenical Foundation (Ökumenisches Studienwerk, ÖSW), the German Business Foundation (Stiftung der Deutschen Wirtschaft, SDW), the Eiselen Foundation, the World Bank, the Volkswagen Foundation, the Daimler Benz Foundation or their own country (students from China, Brazil, Italy). Seventeen students were funded via research projects at ZEF, and ZEF itself supported 14 students with scholarships. In addition, the BMZ, via GTZ and the Robert Bosch Foundation, supported the program with funds for the students' empirical research.

3. The Doctoral Courses

In 2001, more than 160 lectures and seminars were conducted in the doctoral program, approximately 40% by external lecturers. For this, ZEF had invited experts

from leading institutions like Harvard, the Universities of Maryland, Massachusetts and Oslo, ISS (Den Hague), ICT (Enschede), WAU (Wageningen), the Potsdam Institute for Climate Impact Research, and others.

The teaching program includes three course modules spread over the first and third year of the program. The first module provides a sound theoretical background, including knowledge and skills to address the complex and interrelated problems of development. The second and third modules are structured along disciplinary lines in economics, social sciences, and ecology, with a special emphasis on theory and methodology. ZEF also offers training in generic tools and skills. In lieu of the second and third module, individual students may visit laboratories at the University of Bonn or other co-operating institutes in Germany or abroad to learn specific research methods.

PhD students in the International Doctoral Program at ZEF (August 1999-August 2002)

169 students from 44 countries

EU states	49	29%
Middle income countries	26	15%
Low income countries	94	56%

The doctoral program comprises three course modules. The first module provides a sound theoretical background, including knowledge and skills to address the complex and interrelated problems of development, while the second and third modules deal with economics, social sciences, and ecology, focusing on theory and methodology.

All participants 1999-2002		Current PhD students (till June 2002)	New PhD students arriving in August 2002	short-term scholars from outside participating in the courses	Alumni
Region	No.	No.	No.	No.	No.
Africa	53	29	10	8	6
Western and Central Africa	25	17	1	3	4
Eastern and Southern Africa	22	11	7	3	2
Near East and North Africa	6	1	2	2	0
Asia	50	29	10	5	6
Southeast Asia	24	16	2	3	3
South Asia	11	7	3	0	1
East Asia	5	2	0	1	2
Central Asian Republics	9	4	5	0	0
Pacific Islands	1	0	0	1	0
Europe	53	28	9	3	13
Latin America	13	6	4	0	3
Total	169	92	33	16	28

Thirty-four PhD candidates from 18 different countries joined ZEF in the Academic Year 2001/2002.

Policy Dialogue and Public Awareness

Through its research projects, ZEF provides important services for public and private clients with regard to practical and implementation-oriented policy advice. The transfer of this knowledge to different groups of stakeholders, including researchers, policy-makers, and representatives of civil society, takes place through dialogue and exchange. There are a number of channels of communication available for a successful dialogue and exchange: e.g. symposiums, public lectures, workshops and/or conferences, or via the homepage of ZEF or simply through participation and demonstration in the field.

During the war in Afghanistan, ZEF pointed to the limited political significance of ethnicity in TV interviews for CNN and Phoenix. ZEF also scrutinised the recent developments in Afghan politics by commenting the Afghanistan Conference for the BBC, WDR, N-TV, MDR and Phoenix.

Media presence: The examples of Afghanistan and the Kashmir Region

The terrorist attacks of September 11, 2001 catapulted Afghanistan into the centre of world events. Since 1999, ZEF has been carrying out a project on “Ethnic Conflicts in Afghanistan”. Therefore, ZEF was in a good position to give firm analyses of the political situation in Afghanistan and the complex background of the conflict. The main aim was to reveal a differentiated picture of the Afghan war and to contrast unfounded generalisations or wrong assumptions in media coverage of the conflict. ZEF was represented in several ways in the media, pointing out the limited political significance of ethnicity in TV interviews for CNN and Phoenix, and publishing articles about the same issue in daily newspapers such as *Neue Zürcher Zeitung*, *Frankfurter Allgemeine Zeitung* and *Frankfurter Rundschau*. ZEF also scruti-

nised the recent developments in Afghan politics by commenting the Afghanistan Conference on the Petersberg for the BBC, WDR, N-TV, MDR and Phoenix early in December 2001. And ZEF participated in several meetings of the working group “Future Prospects of Afghanistan” held by the German Federal Foreign Office. Additionally, ZEF was represented in the meeting “Reconstruction of Afghanistan” held

by the German Federal Ministry of Economic Cooperation and Development (BMZ) and took part in the workshop “Civil Society”, which was recommended by the United Nations and took place in Bad Honnef in December 2001 and in Berlin in May 2002.

Another hotspot of public awareness is the Kashmir conflict between India and Pakistan, which once again flared up in December 2001. ZEF analysed the conflict in various interviews, e.g. for *Voice of America*, *Deutsche Welle* and *N-TV*. ZEF is also involved in policy consultation and in strengthening the dialogue between Europe and India. For example, it is a member of

Distribution of food in a suburb of Kabul.





the 'Indo-Europe Dialogue Programme' that takes place in spring each year. It also participated in the first meeting of think-tanks between India and Europe in Brussels in October 2001. ZEF was engaged in monitoring the elections in Bangladesh in September/October 2001 as well.

Public Lectures

ZEF organised an interdisciplinary public lecture series centred on the topic "Governing natural resources in developing and transition countries: Problems, current approaches and country-specific solutions". The theme is of obvious relevance to all three departments and touches various research programs at ZEF. About 25 distinguished guest speakers from around the world gave lectures between July 2001 and June 2002. A list of all speakers and topics can be found in the chapter "ZEF - in brief".

Building public awareness at project level

ZEF attaches great importance to close contacts with the target groups of its research activities. Close contacts facilitate the dissemination of research results, the implementation of innovations and the assessment of research-based changes.

For instance, in our project dealing with the development of fire-free alternatives to slash-and-burn in the eastern Amazon region of Brazil, ZEF embarks on different strategies to make or keep contacts with its target groups. The target groups include farmers, co-operatives, extension workers, politicians and rural NGOs as well as mechanical engineering companies and private contractors. Right from start of the project, we opted to carry out all field experiments and the development of new technologies exclusively on small farmers' land, the principal target group of the project. Thus, the farmers are able to follow our activities on a day-to-day basis as the strongest form of accompaniment of the project. In addition to our daily contacts to farmers, regular field days are run. Monthly to bi-monthly, 15 to 20 farmers of a participating community are invited to visit the experimental fields and to discuss technical issues with the project members. In this way, each participating farmer community has about one field day per year. Apart from these "small" field days, once or twice a year, farmers from outside the study region are invited for a field day together with extension workers, municipal politicians (including the mayor), representatives of the agricultural secretary, local bankers and NGOs. These field days have 50 or more participants. The most recent one took place on May 7, 2002. Besides the discussions, the project hands out folders describing the project approach and booklets for farmers illustrating the fire-free alternatives to slash-and-burn. Additionally, a video film was produced which gives an overview of the whole research concept for the development of fire-free land preparation techniques in Amazonian fallow systems. The video is available as a tape or a CD-ROM in Portuguese, English, and German. We use it mainly as teaching material, but also to inform scientists, politicians, companies and journalists in an entertaining way.

Beyond the partnership with the farmers, the ZEF project keeps contact with the private sector. In the context of fire-free land preparation, two different tractor-driven bush-chopper types came into operation. To guarantee maintenance and repair of

Visit at a Nursery,
Eastern Amazon, Brazil



One of the ways the ZEF project dealing with the development of fire-free alternatives to slash-and-burn in Brazil keeps in touch with its target groups is by organising field days with visits to experimental fields.

these choppers, the project is co-operating with two mechanical engineering companies, a local one and one from southern Brazil. In addition, a private contractor experienced in excavation and land-clearing services in eastern Amazonia has enlisted for putting the chopping devices at the farmers' disposal. In 2001, the most important event held together with the private sector was a series of four consecutive days of field demonstrations of our chopping technology on the occasion of the "4th Machinery and Timber Products Show" in Belém, capital of Pará state, from November 20 to 23. ZEF and Embrapa Amazônia Oriental, our scientific counterpart in Brazil, participated as exhibitors. With about 300 visitors in the field demonstrations outside Belém, our innovative approaches for fire-free land preparation created great interest. The participants were farmers, co-operatives, plantation managers, forest owners, politicians (amongst them the governor of Pará state Dr. Almir Gabriel), scientists, students and journalists. Also, a number of politically responsible persons for environmental issues at state level gained significant inspirations.

Publications and information material

ZEF research is covered in its own series of peer-reviewed books and discussion papers. Also, ZEFnews appears three times a year and reports on new developments at ZEF. It is available as a print version in English.

Research at ZEF is well-documented in its own series of peer-reviewed books and discussion papers. During the period between July 2001 and June 2002, a total of 17 books and seven "ZEF Discussion Papers on Development" were published. As a rule, the papers are provided to national, European and international libraries on a mutual exchange basis. In addition, numerous articles of ZEF researchers were published in national and international journals. A list of all the publications can be found in the chapter "ZEF - in brief".

ZEFnews appears three times a year and reports on new developments at ZEF. It is available as a print version in English. It is also dispatched as an e-mail version. All editions can be downloaded from the Internet in pdf format. The ZEF Annual Reports contain detailed overviews of the activities. Information in brief in German and English is provided in the ZEF leaflets.

Prof. Ramón López receiving the prestigious Alexander von Humboldt Award in Berlin



The ZEF homepage is an information and communication medium of growing significance. It was updated in May 2002. The ZEF homepage (www.zef.de) enables world-wide access to the ZEF activities. Each year, an average of 100,000 visitors access this online information service.

Academic awards

The research work of various members of ZEF's academic staff has been honoured by a number of academic awards.

- Prof. Ramón Lopez has received the prestigious Alexander von Humboldt Award. Ramón Lopez is a senior fellow at ZEF and co-operates as a lecturer in our doctoral studies program and as a partner with various environmental economics research projects.



- Joseph Intsiful from Ghana received the highest award for his presentation “Study of the Impact of Land Cover Change on Soil-Vegetation-Atmosphere Interactions” at the summer colloquium at the International Center for Theoretical Physics in Trieste, Italy.
- Frank Mussnug, a ZEF doctoral student and Robert Bosch Foundation scholar, received the Albrecht Thaer Prize from the Faculty of Agriculture and Horticulture, Humboldt University, Berlin, awarded for the best diploma thesis and best student of the year 2000.

The European Development Research Network (EUDN)

Around one and a half years ago, in September 2000, the EUDN was established, with its secretariat being set up at ZEF. It is currently being supported by the Land Government of North Rhine-Westphalia. The network, which originally consisted of 17 European development researchers, was extended by 13 members by official elections in 2001. A further expansion is envisaged for 2002. The idea of EUDN was to support

EUDN in brief

1999, December:

- The Global Development Network (GDN) is inaugurated at the First Annual Global Development Conference in Bonn, Germany.

2000, September:

- The European Hub of the GDN is established at a round-table meeting at ZEF in Bonn, Germany.

October:

- The Executive Committee is elected with the secretariat being established at ZEF. Initial funding is provided by North Rhine-Westphalia, Germany.

December:

- The existence of the Hub, called the European Development Research Network (EUDN), is officially announced at the Second Annual GDN conference in Tokyo, Japan.

2001, October:

- The first EUDN Workshop for doctoral students on development research is held in Bonn.

December:

- EUDN organises a session on “Understanding Reform” and participates in the knowledge fair at the Third Annual GDN Conference in Rio de Janeiro, Brazil.

2002, March:

- The first EUDN Member Workshop is held in Namur, Belgium.

The Global Development Network (GDN) is an amalgamation of research institutes from all over the world. It has the objective of generating, sharing, and applying knowledge for development. EUDN is one of its Regional Networks.



ZEF representing the EUDN at the Global Development Conference in Rio 2001

the Global Development Network (GDN) as one of its Regional Networks. The GDN is an amalgamation of research institutes from all over the world but with a strong focus on developing countries. It was inaugurated at the First Annual Global Development Conference held in Bonn in December 1999 with the objective of generating, sharing, and applying knowledge for development. It also aims at strengthening the capacity of institutes to undertake high-quality, policy-relevant research and to move research results into policy debates. Further details can be found at <http://www.eudn.org>.

The primary role of the European development research network EUDN is to promote co-operation between researchers from Europe and developing countries but also among development researchers throughout Europe. It aims at linking development think-tanks with the rest of the world by focusing on research, dialogue and training.

Global Distance Learning Center

A Memorandum of Understanding has been signed between the University of Bonn and the World Bank to establish a Global Distance Learning Center at ZEF. The Global Distance Learning Network of the World Bank consists of around 40 Distance Learning Centers around the world. Three seminar rooms have been equipped to accommodate video conferences. In the medium term, these facilities will also enable ZEF to translate parts of the courses of the International Doctoral Studies Program into distance learning courses.

Press and visitor service

ZEF press coverage is documented in a ZEF press review issued annually. Information events can be arranged for visitor groups interested in ZEF activities.

The press service comprises the issue of press releases as well as back-up services for journalists via background talks on topical issues of development research. ZEF press coverage is documented in a ZEF press review issued annually. For visitor groups wishing to inform themselves about ZEF activities, information events tailored to their requirements can be arranged after prior consultation.



Management and Central Facilities

IWB Management

Together with its sister institute, the Center for European Integration Studies (ZEI), ZEF forms the International Science Forum Bonn (IWB). Both centres work under one roof and use common facilities. IWB management supports the two centres in central administrative, budgetary, co-ordination, acquisition and communications affairs. Internally, as a cross-centre unit, management is responsible for the efficient use of the common facilities and the resources the centres can dispose of. Externally, particularly in the framework of its public relations and acquisition activities, it establishes links with relevant institutions and persons in politics, industry, science, the media and administration. Above all in financial issues, it provides a link with the Land and Federal ministries. The management has been commissioned by the Rector to represent and co-ordinate the interests and activities of the University of Bonn in the context of EUROPAEUM, a European studies network of the Universities of Bologna, Bonn, Geneva, Leiden, Paris/Sorbonne, Oxford and Prague.

Accommodation facilities

The IWB building is situated in the former government district of the Federal City of Bonn. It has office rooms with modern equipment. All workplaces are linked up with the high-performance computer of the University of Bonn's Computing Centre via a powerful internal computer network with a 100 MB line. The ground floor has three conference rooms that can be linked up and are fitted with modern conference technology. In addition, there are further seminar conference rooms on all floors that are made use of in particular by the students of the continuing education programs. The Bonn Student Welfare Service runs a canteen in the building for the ZEF/ZEI staff.

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Library

The joint infrastructure of ZEF and ZEI includes a library with more than 50 workplaces. The library's media room has ten PCs for Internet work. While the library is mainly reserved for use by ZEF/ZEI staff, it is available to the public at certain times.

Books, journals, data banks

In the library, which has been in existence for four years, around 16,000 monographs are available for users. The journals department offers about 1,300 titles. In addition, the library has several data banks, including those of the European Commission, the OECD and the International Monetary Fund. The IWB library has the official status of a European Documentation Center (EDC) of the EU. The EDC contains all documents issued by the European Commission since 1986. They can be searched and viewed electronically. In addition, the library has the status of an OSCE Depot Library and the status of a European Parliament Depot Library. The documents of the European Court of Justice and the European Central Bank as well as almost all statistical journal series of the EU (going back to the beginnings of the European Common Market) are available.



ZEF Evaluation

The recently completed first evaluation by an external and independent expert team has assessed ZEF's performance and has given recommendations for further improvements. The main findings and recommendations were summarised by the Evaluation Commission, consisting of

Prof. em. Dr. Dr. h.c. Dieter Oberndörfer, Arnold Bergstraesser Institute, Freiburg i. Br. (Chair),
Dr. Ulrich Hiemenz, Director OECD Development Centre/Paris,
Prof. Dr. Franz Nuscheler, Institute for Development and Peace /University of Duisburg, and
Prof.em. Dr. Paul Streeten, Spencertown, New York/USA

The report is available in German only (<http://www.zef.de>). The following translation of the conclusions section of the evaluation report is provided by ZEF below.

Main Findings and Recommendations

I. Appropriateness of the Mission, Strategy and Priorities

ZEF's mandate is defined in the foundation concept of the Senate of the University of Bonn. It calls for development-related basic research and application-oriented research on concrete development issues for providing advice to practitioners and policy-makers.

In the 'Strategy for the Future', a strategy paper developed in 2000 by the directors and staff in collaboration with the ZEF International Advisory Board, the specifications of the Senate's concept concerning research, teaching activities and knowledge transfer are put into concrete terms.

ZEF's activities address pivotal issues of topical interest in international development policy and development research. All topics currently being worked on are relevant for development research. On the one hand, new fields of research are being built up that anticipate future developments, such as the question of the potentials of new technologies for poor populations (biotechnology, information technology). On the other hand, research is being conducted in already established fields. In this way, ZEF demonstrates competence in "classical" fields of research together with innovative potential, thus being able to establish itself in new research fields.

ZEF strives successfully to develop new fields of research with minimal duplication and justifiable initial investments. Research issues that are the principal domains of other research facilities or, as is the case with education research, issues that require large initial investments were not included in ZEF's future research agenda owing to the Center's limited human and financial resources.

ZEF's core activities, which emphasise the fact that it is a research institute, corre-

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spond to those of a university institute. They include, as is impressively documented by the ZEF projects, a comprehensive program of practical application-oriented research policy and advice (e.g. river basin management; global register of migrating species; on bridging divide; on state formation and ethnic conflicts; examples in Annex B of the full report in German).

ZEF's interdisciplinary program of development-related issues on the basis of solid disciplinary research, but combining natural and social science disciplines, distinguishes it from the German and from many international research institutions. In fact, the linkage between the research fields of Natural Resources and Political Science and Economics is a pioneering feat in Germany. The Commission was impressed by how successfully ZEF has been able to implement interdisciplinary teamwork and methods as well as the especially difficult integrative approach of interdisciplinary research.

Not only do ZEF's research activities overcome the frontiers between different disciplines, they also transcend those between science, business, and non-governmental organisations, as well as the barriers between people from different countries. This is really new territory not only from an intellectual but also from a political point of view.

ZEF's comparative advantage lies not only in its interdisciplinary program and the wide range of its themes, but also in its international character and the use of English as its working language. On that score, ZEF is unique in Germany. In the face of the growing importance of English as the language used in science world-wide, ZEF has a higher profile at an international level and experiences more response to its activities than scientific facilities with mainly German publications and conferences.

In spite of inherent tensions that may possibly arise from the different perspectives of the involved disciplines, ZEF's practised conceptual interdisciplinary work does in fact lead to thematic coherence.

II. Efficiency and Effectiveness of Management and Organisational Structures

ZEF's organisational structures correspond excellently to the demands of modern, flexible science management. Here, the mandatory individual freedom of scientists can be combined with the great development policy challenges of our time, creating a coherent research program. "Accountability" and consensual decision-making processes allow a highly flexible management without impairing the quality assurance process.

The directors' responsibilities in the individual departments and projects and with regard to their staff are clearly defined; at the same time, the friendly, helpful and loyal working atmosphere incorporates the staff in decision-making processes. The Evaluation Commission was given the impression that this kind of science management has proven to be extremely efficient, as it enhances the commitment and sense of responsibility of each staff member, without jeopardising the coherence of the program.

ZEF's reputation in research, teaching and policy dialogue achieved to date proves that, in fulfilling their tasks in science management, public relations, research and

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teaching, the directors are not only highly committed and extremely disciplined but also extremely effective.

ZEF's international Advisory Board has an important function both in quality assurance and in the formulation of research strategies. The composition of the Board (16 members from science, politics, the ministries, international organisations and business) seems balanced and guarantees high practical orientation, especially as 25 percent of the members come from countries with developing and transforming economies.

The funds available for management and administration are used efficiently in co-operation with ZEI. However, due to the rapid growth of the Center through third-party funds, administrative constraints are appearing. This growth in the program of ZEF makes larger administration capacities both desirable and urgently necessary. Despite some friction, co-operation with the administration of the University of Bonn has shown an overall positive development and is indispensable for fulfilment of ZEF's mandate.

Recommendation

- The link between ZEF and ZEI has not led to the desired synergy effects, except for the jointly used services. Because of the difference in the thematic issues focussed on by ZEF and ZEI, a division between the two centres that is more easily perceptible from the outside is perhaps advisable. In any case, in the present situation, expectations are raised regarding joint work that cannot be fulfilled thematically and administratively. However, this in no way excludes continued co-operation in the use of logistics (e.g. library).
- The success achieved by ZEF in such a short time cannot be continued in the long run without additional administrative staff. If the current volume of third-party funding is to be managed appropriately and without curtailment in other areas, additional staff is imperative for personnel and accounting. On the other hand, this also means that the volume of third-party funding will have to be noticeably reduced should the core budget be lowered after the year 2004, which would reduce the funds available for management and administration. A sufficient number of permanent positions in ZEF for project management (including for the doctoral program) is a necessary prerequisite for ensuring substantial continuity of the Center's activities over plannable time periods and for maintaining the successful profile achieved to date.
- It would be desirable if political reforms, in the framework of reformed university and labour laws, were to create better conditions for the Center's international networking activities.

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III. Quality and Importance of Research in the Departments

All ZEF departments are equipped with excellent leadership and staff, and have performed their tasks with outstanding academic quality. The large number of publications, invitations to conferences, and the close international networking of the departments illustrate this well. ZEF's themes are at the centre of the international development-policy debate to which ZEF has provided several major contributions. The research projects for public and private clients have substantially contributed to practical and application-oriented policy advice and knowledge transfer in important



fields of development policy and their institutions.

Overall, it can therefore be stated that with the creation of ZEF an internationally competitive scientific institute was successfully built, the German research landscape has been enriched, and this will contribute to lending more weight to the German voice in the international development policy debate.

Recommendations

As a result of the delayed filling of the chair for political science (1999/2000), the interdisciplinary linkage of the work in the department for "Political and Cultural Change" with the projects of the other departments is still at an early stage. Emphasis should be placed on the development of this linkage.

IV. Knowledge Transfer and Public Awareness

As mentioned above, through its research projects ZEF provides important services for public and private clients with regard to practical and implementation-oriented policy advice, and knowledge transfer in major fields of development policy and its institutions.

ZEF's knowledge transfer is oriented around its own research horizon; its impressive activities are documented by the numerous publications, symposiums, public lectures, workshops and conferences. ZEF regularly organises public lectures held by guest speakers from all over the world. Between July 2000 and June 2001 alone, these public lectures numbered around 40. They served as an important contribution to the profile of Bonn as a "North-South Center". The well-attended international conferences demonstrate the targeted international image and the channelling of research results, which are published reviewed in books. Application-oriented consolidation of the research results takes place three times a year in ZEF News, which is issued in German and English. The mission to channel and prepare the research results for a wide public is demonstrated by such activities as the international congress "Weltachsen 2000" (World Axes 2000), jointly organised by ZEF and ZEI with a number of internationally renowned personalities from politics, business, and culture. Also to be mentioned are the Global Dialogue on the future of rural areas at the EXPO 2000 in Hanover; the conference on the prevention of ethnic conflicts, which attracted considerable attention from all over the world; and series of events such as the "Bonn Dialogue on Development Policy", which has already taken place seven times.

The ZEF directors and several Senior Fellows have focused their activities on knowledge transfer at international level (e.g., in advisory functions and forums such as UN, UNESCO, FAO, World Bank, Global Development Network, G8-Task Force, Davos Forum), and to a number of important developing countries (especially China, India, Columbia, Brazil, South Africa). In the face of the relatively minor presence of German development research at international level, this is an achievement that cannot be appreciated enough in its importance for the reputation of German science and the linkage of German development policy research with international debates. With regard to dissemination of its findings, ZEF places more emphasis on global information services than on traditional presswork. www.zef.de is one of the most frequently visited web-sites of development research facilities in Europe (as many as about 30,000 visitors a month), and ZEF is a member of "euforic" and "oneworld", the leading NGO and NPO development networks world-wide.

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Nevertheless, deficits in knowledge transfer exist especially in Germany. Such knowledge transfer not only calls for solid basic research, which ZEF offers without any doubt, but also for an increasingly more offensive dissemination of ZEF's research results through enhanced public relations work and a more active participation of ZEF's scientists in national dialogue fora and advisory organisations.

Recommendations

The Commission emphasises that in the set-up phase till now, the consolidation of ZEF's scientific research and the doctoral program were priority issues. With regard to knowledge transfer at an international level, ZEF has already been highly successful. Considering existing deficits as far as ZEF's presence in local development policy organisations and fora is concerned, the "opening to the outside" specified in the foundation concept of the Senate of the University of Bonn must be further emphasised in future. ZEF's considerable scientific reputation, which is most certainly to grow further, will facilitate its public relations assignment.

V. Doctoral Program

ZEF's doctoral program contributes significantly to the general reform of doctoral studies. Internationality is fostered thanks to the different origins of the doctoral students and the better compatibility with the academic systems in the United Kingdom and the USA. One particular advantage of the program is that the doctoral students - in contrast to the situation common at German universities - are not left alone but are instructed in tutorials. A yet greater advantage is the fact that the doctoral students - coming mostly from different disciplines - are taught how to think in an interdisciplinary way. This is not only a result of the themes offered in the obligatory courses, but also because the doctoral students live and work closely together during the doctoral program. The talks the Commission had with the staff and doctoral students confirmed these impressions.

The modular teaching program ensures coherence of topics and a mixture of "disciplinary depth" and "interdisciplinary width".

ZEF's teaching staff are indisputably highly qualified. In contrast with other comparable institutions, ZEF can invite guest scientists from abroad. Development issues are analysed and interpreted not only from the euro-centric perspective, but also on the basis of the experience of those involved. Here, ZEF has a great opportunity, which it has already utilised substantially. Already at the founding stage, ZEF established commendable linkages with similar research facilities in OECD countries and numerous developing and transforming economies, which can be expanded in the coming years. These networking efforts deserve great credit.

With its doctoral program, ZEF can certainly claim to be absolutely unique in the German university landscape.

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Recommendations

- The transfer of the knowledge from the doctoral students' work to a wider general public could be improved. Besides the publication of the theses and the presentation of the results in the Internet, a stronger participation of the doctoral students in conferences and the provision of publications for a more general public are conceivable.
- Many students complain about insufficient workplaces due to the inadequate space in the ZEF building. Should this be true, the situation ought be improved.
- An increase in the percentage of students from industrialised countries is desirable, also to avoid the impression that the program is exclusively for students from developing countries. The Commission realises, however, that it is rather difficult to obtain funds for these students.

VI. Conclusion

The Evaluation Commission was deeply impressed by ZEF's achievements in the relatively short three years since its establishment in the teaching, research, and knowledge transfer activities as defined in the Senate's foundation document. The Commission's evaluation report and the summary of its findings draw an exceedingly positive picture of ZEF's performance and scientific potential as well as of its model character for the scientific landscape in Germany, and for practical and application-relevant development research. The model character of ZEF regarding linkages with international research is also to be acknowledged. Not least in view of the continuous, successive reduction in the number of relevant chairs and institutes for development research for years elsewhere, the Evaluation Commission recommends by unanimous vote that the work program of ZEF should by all means be continuously supported and further expanded.

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ZEF – in Brief

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Park, Soojin, Dr.	Senior Scientist	Pedogenesis, Soil Landscape Analysis, Management in Developing Countries, Spatial Statistics	Korea	
Peters, Hanna	Research Assistant	International Doctoral Studies Program	Germany	
Retat-Amin, Maike	Research Assistant	Administration - International Doctoral Studies Program	Germany	
Ring, Andreas	Research Assistant	Organization Support	Germany	
Rodríguez Kuhl, Gabriela	Research Assistant	Nutrient Balances in the Tropics	Argentina	
Rupprecht, Deborah	Technical Assistant	Conducting Laboratory Analysis by Mass Spectrometry (IRMS), Stable Isotope Research	Germany	Institute for Agricultural Chemistry, University of Bonn
Ruzieva, Gulbackhor	Research Assistant	GIS, Remote Sensing	Uzbekistan	
Schmidt, Petra, Dr.	Senior Scientist	Agroforestry Systems	Germany	Staatliches Museum für Naturkunde, Karlsruhe
Sommer, Rolf, Dr.	Senior Scientist	Water and Nutrient Balances, Modeling of Water Movement in Slash and Burn Systems	Germany	
Stein, Alfred, Prof. Dr.	Senior Fellow	Statistics and Mathematics	Netherlands	Wageningen Agricultural University
Teimann, Sonia	Research Assistant	Scientific Presentations, Editing of Scientific Texts	Germany	
Tiessen, Holm, Prof. Dr.	Senior Fellow	Organic Matter and Nutrient Dynamics in Tropical Ecosystems	Germany/Canada	University of Saskatchewan, Canada
Tischbein, Bernd	Research Assistant	Remote Sensing	Germany	ZFL, University of Bonn



Name, Title	Position	Area of Research	Country of Origin	Affiliation
van de Giesen, Nick, Dr.	Senior Scientist	Hydrology, Effect of Land Use Changes on Water Resources, Geographical Information Systems	Netherlands	RSRG, University of Bonn Embrapa, Brazil IFU, Garmisch-Partenkirchen
Vescovi, Fabio, Dr.	Senior Scientist	Agronomy, Remote Sensing, Land Use Change, Vegetation Cover	Italy	
Vielhauer, Konrad, Dr. Wassmann, Rainer, Dr.	Senior Scientist Fellow	Agronomy, Plant Nutrition Global Climate Change and Tropical Agriculture	Germany Germany	
Wei, Qi	Research Assistant	Economics	China	
Zavgorodnyaya, Darya	Research Assistant	Water Management in Irrigated Agriculture	Uzbekistan	

The list of ZEF doctoral students can be found at http://www.zef.de/zef_englisch/f_studien.htm



Workshops/Conferences

07. - 09. 11.01

Workshop: "Tropical Agriculture in Transition - Opportunities for Mitigating Greenhouse Gas Emissions?"

ZEF Bonn

Co-sponsored by Fraunhofer Institute for Atmospheric Environmental Research (IFU)

18. - 21.12.01

Workshop: "Small-Scale Farmers in the Amazon: Interaction between Ecosystem and Socio-Economic System in the Management of Tropical Forests: Planning and Coordination Workshop"

Belém, Brazil

14.02.02

Podiumsdiskussion: "Wieder Krieg um Kaschmir?"

University Bonn

17. - 23. 02.02

Workshop: "Introduction to Applied Computable General Equilibrium (CGE) Modeling for Development Policy Analysis"

Chair for Economics and Agricultural Policy, Univ. Bonn

International Food Policy Research Institute (IFPRI), Washington, D.C.

21. - 23. 04.02

"Workshop: New Institutional and Economic Approaches to Health Insurance for the Poor in India"

ZEF Bonn

Co-financed by Volkswagen Foundation

05. - 06. 05.02

Workshop: "Bioinformatics for migratory animals - future possibilities of data integration"

06. -08. 05.02

GLOWA Status Conference, Munich

09.05.02

Workshop: "Community based Irrigation Management in Northern Ghana"

Bolgatanga, Ghana

Co-financed by Robert-Bosch-Foundation

13. - 17. 05.02

Kick-Off Workshop of ZEF/UNESCO Khorezm Project

Tashkent and Urgench

23. - 25.05.02

Workshop: "Paradigms of Change"

Co-financed by Volkswagen Foundation

14.06 - 15.06.02

Launching Seminar of ZEF-ERF Project "Enhancing Law-making for Economic Reform in Arab Countries"

Cairo, Egypt



Selected Publications of ZEF 2001/2002

1. ZEF Discussion Papers on Development Policy

No. 39:

U. Grote, S. Kirchhoff: Environmental and Food Safety Standards in the context of Trade Liberalization: Issues and Options, Bonn, June 2001.

No. 40:

S. Dietz, R. Schubert: Environmental Kuznets Curve, Biodiversity and Sustainability, Bonn, October 2001.

No. 41:

A.M. Ibañez, S. Kirchhoff: Displacement due to Violence in Colombia: Determinants and Consequences at the Household Level, Bonn, October 2001.

No. 42:

F. Matambalya, S. Wolf: The Role of ICT for the Performance of SMEs in East Africa, Bonn, December 2001.

No. 43:

I. Falk, O. Stark: Dynasties and Destiny: On the Roles of Altruism and Impatience in the Evolution of Consumption and Bequests, Bonn, December 2001.

No. 44:

A. Admassie: Allocation of Children's Time Endowment between Schooling and Work in Rural Ethiopia, Bonn, February 2002.

No. 45:

A. Wimmer, C. Schetter: State-Formation First. Recommendations for Reconstruction and Peace-Making in Afghanistan, Bonn, April 2002.

A. Wimmer, C. Schetter: Staatsbildung zuerst. Empfehlungen zum Wiederaufbau und zur Befriedung Afghanistans, Bonn, April 2002.

No. 46:

Feldbrügge, T., J. von Braun: Is the World Becoming A More Risky Place? Trends in Disasters and Vulnerability to Them, Bonn, May 2002.

No. 47:

Braun, J. von, P. Wobst, U. Grote: "Development Box" and Special and Differential Treatment for Food Security of Developing Countries: Potentials, Limitations and Implementation Issues, Bonn, May 2002.



2. Book and Monograph Publications of ZEF-Staff and Collaborators

- Abdullah, L.: "P-mineralization and immobilization as a result of use of fallow vegetation biomass in a slash and mulch system", University of Göttingen. Cuvillier Verlag, Göttingen, 2001.
- Bertolini, R.: "Telecommunication Services in Sub-Saharan Africa - An Analysis of Access and Use in the Southern Volta Region in Ghana", (Series 'Development Economics and Policy' edited by Franz Heidhues and Joachim von Braun), Peter Lang Verlag, Frankfurt/Main, 2002.
- El-Mikawy, N. and H. Handousa (Eds.): "Institutional Reform & Economic Development in Egypt." American University in Cairo Press, Cairo, 2002.
- Iskandarani, M.: "Economics of Household Water Security in Jordan", (Series 'Development Economics and Policy' edited by Franz Heidhues and Joachim von Braun), Peter Lang Verlag, Frankfurt/Main, 2002.
- Jones-Pauly, C. and E. Niesner: "Trafficking in Women in Europe. Frauenhandel in Europa. Strafverfolgung und Opferschutz im europäischen Vergleich", Kleine Verlag, Bielefeld, 2001.
- Kössler, R. and H. Wienold: "Gesellschaft bei Marx", Westfälisches Dampfboot, Münster, 2001.
- Kuhn, A.: "Handelskosten und regionale (Des-)Integration - Russlands Agrarmärkte in der Transformation", (Series 'Development Economics and Policy' edited by Franz Heidhues and Joachim von Braun), Vol. 21, Peter Lang Verlag, Frankfurt/Main, 2001.
- Martius, C., H. Tiessen, and P.L.G. Vlek (eds.): "Management of Organic Matter in Tropical Soils: Scope and Limitations", Kluwer, Dordrecht, 2001.
- Martius, C., H. Tiessen and P.L.G. Vlek (eds.): "Management of Organic Matter in Tropical Soils: Scope and Limitations", Nutrient Cycling in Agroecosystems 61 (1-2), 2001.
- Müller-Falke, D.: "Use and Impact of Information and Communication Technologies in Developing Countries' Small Businesses: Evidence from Indian Small Scale Industry", (Series 'Development Economics and Policy' edited by Franz Heidhues and Joachim von Braun), Peter Lang Verlag, Frankfurt/Main, 2002.
- Nölle-Karimi, C., C. Schetter and R. Schlagintweit (eds.): "Afghanistan - A Country without a State?", IKO-Verlag, Frankfurt/Main., 2002.
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- Sheng, Mingzhi: *Lebensmittelkonsum und Konsumtrends in in China. Eine empirische Analyse auf der Basis ökonomischer Nachfragemodelle*, Peter lang, Frankfurt 2002
- Virchow, D., Braun, J. von (eds.): "Villages in the Future: Crops, Jobs and Livelihood", Springer-Verlag Berlin Heidelberg, 2001.
- Wehrheim, P.: "Modeling Russia's Economy in Transition", Ashgate Academic Publishers, Aldershot, 2002.
- Wimmer, A.: "Nationalist Exclusion and Ethnic Violence. Shadows of Modernity", Cambridge University Press, Cambridge, 2002.

3. Selected Reviewed Articles of ZEF-Staff

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- Asante, A., Berger, T., Engel, S. and M. Iskandarani: "Water security in the Ghanaian Volta Basin: Patterns, determinants, and consequences", In: *Quarterly Journal of International Agriculture*, 41 (1/2). Special issue on Agricultural water management and land use in relation to future water supply, pp. 145-167.
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- Berger, T.: "Agent-based spatial models applied to agriculture: a simulation tool for technology diffusion, resource use changes and policy analysis", In: *Agricultural Economics* 25 (2/3), 2001, pp. 245-260.
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- Braun, J. von: "Globalization and Decentralization: Combining Economic Efficiency with Poverty Reduction and Peoples Participation". In: *China Economic Times* (January 2002), in Chinese
- Braun, J. von: "Is Globalization Taking a Pause? Implications for International Agriculture and Food Security Policy". In: *Quarterly Journal for International Agriculture*, 2002, No. 2, pp. 1-4.
- Braun, J. von: "Ernährung der wachsenden Weltbevölkerung".
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- Braun, J. von: "Die Problematik der Armen in der Globalisierung".
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- De Soysa, I.: "Paradise is a Bazaar?: Testing the Greed, Creed, Grievance, and Governance on Civil War, 1989-1999",
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- El-Mikawy, N.: "Labor Representation in the Age of Globalization: Trends & Issues in Non-Oil-Based Arab Economies",
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- Engel, S.: "Meta-analysis vs. benefit function transfer as policy-making tools: A comparison", In: Florax, R.J.G.M., Nijkamp, P. and K. Willis (eds.), *Comparative Environmental Economic Assessment*, Edward Elgar Publishing House, Cheltenham, 2002.
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List of Projects at ZEF 2001-2002

Name of the Project <i>Duration of the Project</i> Funding Organization <i>Country of Implementation</i>

Cross-cutting Research

Theories of Development and Change

Paradigms of Change

01/01 – 06/02

ZEF

Global

Poverty and Equity

Strengthening Social Security Systems in Developing Countries

1997 – 2002

ZEF in cooperation with ILO

Global

New Institutional and Economic Approaches to Health Insurance for the Poor in India

01 /02 – 01 /04

Volkswagen Foundation

India

Gender, Religion and Development in Rural Bangladesh

10/01 - 09/04

ZEF

Bangladesh

Natural Resource Scarcity

The Politics of Indonesian Rainforest. A Study of Forest Conflicts in East Kalimantan

10/00 – 09/03

ZEF

Indonesia

Determinants and Effects of Alternatives Institutions for Natural Resource Management in Developing Countries

04/01 – 03 /04

Robert Bosch Foundation

Ghana, Indonesia, India, Sri Lanka, Vietnam

United Nations Involvement in the Environment

09/01 – 10/01

United Nations Volunteers (UNV)

Global

Democracy, Rule of Law and Governance

Public Law and Governance

06/00 – 02/03

ZEF

Paraguay, Chile

Economic Globalization, Political Democracy and Governance

06/00 – 05/03

ZEF

Global

Governance and Economic Development

1998 – 2001

ZEF, The World Bank

China, India, Russia

Role of the State in Political and Economic Development

1998 – 2001

ZEF in cooperation with research organizations and universities in Egypt

Egypt

Accessibility of Constitutional Jurisdiction

05/02 – 02/04

ZEF

Global

Political Science Tool for Assessing Feasibility and Sustainability of Reforms

03/02 – 05/02

ZEF on behalf of the International Monetary Fund

Pakistan

Constitutional Draft for Burma/Myanmar

11/01 - 12/01

ZEF on behalf of the Friedrich-Ebert Foundation

Burma/Myanmar

Role of Court Administrators and Law Adjudicators in Assuring Access to Justice

09/01 - 08/02

ZEF

Britain, Burundi, Ghana, South Africa, Sudan, Tanzania

Governance in the Caspian Sea Region: The Political and Social Dynamics of Resource-Led Development

05/02 - 05/03

ZEF in cooperation with the National Bureau of Asian Research, Seattle

Caspian Sea Region

Specific Research Areas

Department of Political and Cultural Change

Ethnic Conflict and State Building

Shadows of Modernity, State-Building, Nationalism and Ethnic Conflict

10/99 – 06/01

ZEF

Irak, Mexico, Switzerland

Health Policy in Multiethnic Societies: Lessons from Comparative Analysis between Malaysia and Lebanon

10/01 - 09/04

ZEF

Malaysia, Lebanon

Towards an Institutionalized Development Planning Process in the State of Palestine

04/01 – 03/04

ZEF

Palestina

Ethnicity and Ethnic Conflicts in Afghanistan

10/99 - 12/04

ZEF

Afghanistan

Democracy, State and Ethnic Conflict in South Asia

07/01 - 12/04

ZEF

South Asia

Limits of Regionalism and Interethnicity in Vojvodina, Serbia's 'Multiethnic Heaven'

08/01 - 08/02

ZEF

Yugoslavia

Contemporary Reformist Approaches to Plurality in Southeast-Asian Islam

04/02 - 03/04

DFG

Germany/Indonesia, Malaysia

Conflict and Reconstruction in Central Asia

since 01/02

GTZ

Central Asia

The Study on Effects of Changing Local Resource Management Practice to the Livelihood and Forest Cover of Selected Ethnic Minority Communities in Northern Thailand

10/01-09/04

ZEF

Thailand

Culture, Knowledge and Development

Globalization of Knowledge: Development Experts

07/00 – 06/02

ZEF in Cooperation with the Sociology of Development Research Center and the Institute for the Study of World Society, University of Bielefeld

Indonesia, Singapore, Kazakhstan, Uzbekistan, Philippines, Malaysia

Social Capital and Solid Waste Management Organisation: Case Studies from Urban Bangladesh

10/01 - 09/04

ZEF

Bangladesh

Knowledge Management

09/01-08/03

ZEF in cooperation with the Management University of Singapore

Singapore

Knowledge Society

10/00-12/02

ZEF in cooperation with the Institute of Malaysian and International Studies (IKMAS), University of Malaysia

The Rise of Political Islam in Sudan: Economic Transformation and Social Differentiation

10/00 – 09/03

ZEF

Sudan

Does Culture Matter? Politics and Governance in the Mediterranean

01/01 – 06/01

ZEF in cooperation with the Center for European Integration Studies (ZEI)

Mediterranean Region

From Subject to Citizen? Political Anthropology of Development in Nepal/Himalaya

10/99 – 04/01

ZEF

Nepal/Himalaya

The European Development Research Network (EUDN) of the Global Development Network (GDN)

09/00 – 08/03

State of North Rhine-Westphalia

Global

Strengthening Cooperation and Capacities in Development Research and Teaching

05/02 – 05/05

German Agency for the Technical Cooperation (GTZ)

Global

Institutions of Civil Society: Cross-National Studies

10/01 - 09/04

ZEF

Germany, USA, Russia, Kyrgyzstan and Turkey

Popular Participation and Local Development : The Role of Social Actors in the Consolidation of Productive Municipalities in the Area of East Chuquisaca, Bolivia

10/01 - 09/04

ZEF

Bolivia

Human Rights

Privatizing Peace? A Case Study in Guatemala

9/00- 09/03

ZEF

Guatemala

Trick or Trickle: Human Rights Norms and Development Practices in Guatemala

03/00 – 02/02

ZEF

Guatemala

Mitigating Human Rights Risks

06/00 – 05/04

ZEF in cooperation with the Center for Socio-Legal Studies of Oxford University

India, Malaysia, Ukraine, Mexico

Socio-Legal and Jurisprudential Aspects of Colonial and Presentday Legal Orders

04/01 – 10/01

ZEF in cooperation with the Centre for the Socio-Legal Studies of Oxford University

Malaysia

Prioritizing Human Rights

06/00 - 01/02

ZEF

Global

Human Rights in a Globalizing Economy: Legal Risks Management of Multinationals in Developing Countries

06/00 - 12/05

ZEF in cooperation with the Centre for Socio-Legal Studies of Oxford University

Caspian Sea, China, Indonesia, Peru, Tanzania, Canada, U.S.A.

Implementation – A Step Beyond Ratification

02/02 - 02/03

ZEF in cooperation with the United Nations Volunteers

Global

The Incidence and Determinants of Child Labour in Africa: The Case of Ethiopia

1999 – 2002

ZEF on collaboration with Addis Abeba University

Sub-Saharan Africa, Ethiopia

Department of Economics and Technological Change

Poverty Reduction

Urban Poverty in Ethiopia. Addressing Shelter and Environmental Problems through Partnership. A Case Study of Addis Ababa

10/00 – 09/03

ZEF

Ethiopia

The Determinants, Effects and Costs of Displacement Due to Violence in Colombia

09/99 - 02

Colombian National Planning Department, Colciencias; ZEF

Colombia

Demand and Impact of Community-Based Health Insurance

1999 – 2002

ZEF in cooperation with research partners from the study countries, DAAD, Volkswagen-Foundation

Ghana, Ethiopia, China, Tanzania, India, Senegal

Volume and Economic Value of Volunteering in Countries of Different Income Levels

09/00 – 06/02

ZEF in cooperation with United Nations Development Programm/United Nations Volunteers (UNDP/UNV)

South Korea, Bangladesh, Ghana, Poland

Trade and Macroeconomic Issues of Development

The Future of EU-ACP Relations

1997 – 2002

ZEF

ACP countries

Enhancing Economic Legislation in Selected Arab Countries

12/01 – 12/04

German Agency for the Technical Cooperation (GTZ) and ZEF in cooperation with ERF

Egypt, Jordan, Morocco

Political Risk for Foreign Direct Investment: Empirical Evidence from Regions of Russia

10/01 - 09/04

ZEF

Russia

Efficiency in Resource Utilization and Technologies for Development

Quality Improvement of Food and Substances Production with Biotechnology, Its Importance for Developing Countries and Economic Valuation. (Study Grant)

04/01 – 03/03

Eiselen Foundation

Germany

Economics of Household Water Security in Jordan

05/98 – 05/01

ZEF

Jordan

Information and Communication Technologies in Developing Countries

1998 – 2002

ZEF in cooperation with various research partners in study countries, and with GTZ

Bangladesh, Peru, China, India, Tanzania, Uganda, Ghana

Rural Telecommunication in Lao P.D.R. in Co-operation with Lao Telecommunications Corporation

1999 – 2002

KfW and ZEF

Laos

Global Register of Migratory Species (GROMS)

11/97 – 10/02

Federal Ministry of Environment (BMU) through the Federal Agency of Nature Conservation (BfN), Bonn, Germany

Global

Smallholders in the Amazon: Interactions Between the Ecosystem and the Socioeconomic System in the Protection and Use of Tropical Rainforests

02/01 – 01 /04

Shift Program of BMBF (Bonn) and NAEA (Belém, Brasil)

Brazil

Biodiversity and Economics for Conservation (Bioecon)

2001 – 2003

ZEF in cooperation with European Commission

Africa/Asia

Policies for Improved Land Management in Uganda

1999 – 2002

Federal Ministry of Economic Cooperation and Development (BMZ) with IFPRI

Uganda

Policy Analysis for Sustainable Agricultural Development in Central and Eastern Europe and Southern Africa

07/02 – 06/05

Bosch Foundation

Department of Ecology and Natural Resource Management

Atmosphere and Water Management

The Impact of Structural Adjustment Programmes on the Institutional and Regulatory Framework for the Environment: The Case of the Mining Sector in Peru

10/00 – 09/03

ZEF in cooperation with Proterra (Peruvian environmental NGO)

Peru

Assessing the Impact of Climate Change on the Hydrology of River Basins and Tropical River-Delta Areas

1998 – 2002

ZEF

Latin America

Modelling Water Use Efficiency in a Large-Scale Irrigation System

10/99 – 12/02

ZEF in cooperation with the International Rice Research Institute (IRRI)

Philippines

Sustainable Water Use under Changing Land Use, Rainfall Reliability, and Water Demands in the Volta Basin (GLOWA-Volta)

05/00 – 04/03

German Federal Ministry of Education and Research (BMBF) and Ministry for School and Education, Science and Research of North Rhine-Westphalia

Ghana, Burkina Faso

Optimizing the Routine Water Quality Monitoring System for the Aconcagua River

10/01-09/04

ZEF in cooperation with FH-Köln, GTZ

Chile

Institutional Management of Water Technologies with specific Reference to Hydropower in Nepal: Advancing Equity choices

10/01 - 09/04

ZEF

Nepal

Sustainable Land Use Systems

Farmers Reaction Towards Environmental Degradation and Sustainable Rural Development

10/01-09/04

ZEF

Ethiopia

Family Agriculture: The Historical Dynamics of Reproduction in an Agrarian Frontier Area in the Eastern Amazon Region of Brazil

01/00-12/02

ZEF

Brazil

Towards Realization of Kenya's full Beekeeping Potential: a Case Study of Baringo District

10/00-09/03

ZEF in cooperation with the Kenya Forestry Research Institute (KEFRI)

Kenya

Organic Fertilizer Decomposition, Nutrient Release and Nutrient Uptake by Millet Crop in a Traditional Land Rehabilitation Technique (Zäi), in the Sahel

1998 – 06/02

International Crop Research Institute for the Semi-Arid Tropics (ICRISAT), Sahelian Center in Niamey Niger

Soil N Mineralization Dynamics as Affected by Pure and Mixed Application of Leafy Material from Various Leguminous Trees Used in Planted Fallow in Brazil

10/98 – 2002

CNPq/Brazil, DAAD/Germany

Brazil, Göttingen/Germany

Management of Plant Organic Matter and Its Effects on Litter Decomposition and Soil Macrofauna in Central Amazonian Agroecosystems

09/00 – 08/03

Shift Program of BMBF (Bonn) CNPq (Brasilia, Brazil) and State Museum for the Natural History, Karlsruhe Brazil

Impact of Changing Land Cover on the Production and Ecological Functions of Vegetation in Inland Valleys in West-Africa.

11/01 – 11/05

EU

Burkina Faso, Ghana

Managing N Fertilization Through Crop Demand-Driven Field Specific Application

10/01-09/04

ZEF in cooperation with IRRI

Myanmar

Uzbekistan – Economic and Ecological Restructuring of Land- and Water-Use in the Khorezm Region – A Pilot Project in Development Research.

11/01 – 12/04

German Federal Ministry of Education and Research (BMBF) and Ministry for Schools and Education, Science and Research of North Rhine-Westphalia

Uzbekistan

The Role of Biological Nitrogen Fixation in Fallows and Forests of Central Amazonia

07/98-12/02

Shift Program of BMBF

Central Amazonia

Phosphate Mineralization and Immobilization in Slash and Mulch System in South-East Sulawesi, Indonesia

10/97-02/02

ZEF in cooperation with the Institute of Agronomy in the Tropics and Subtropics (IAT) at the University

Göttingen, Germany

Indonesia

The Role of Biological Nitrogen Fixation in Cacao Agroforestry System in Central Sulawesi

10/01-09/04

ZEF in cooperation with the University of Göttingen, Institut Pertanian of Bogor (IPB)

Indonesia

The Role of Azolla Cover in Improving the Nitrogen Use Efficiency of Lowland Rice

10/98-06/02

ZEF in cooperation with the Philippine Rice Research Institute (PhilRice)

Philippines

Modelling Land-Use/Land-Cover Dynamics and Drivers with an Implication to Monitoring processes of Resource Degradation in Northern Ethiopia

10/01-09/04

ZEF

Ethiopia

Pesticides on Soil Fauna and Processes - Development of Ecotoxicological Test Methods for Tropical Regions

10/00-09/03

ZEF in cooperation with Embrapa Amazônia Ocidental, Manaus, Brazil

Brazil

Characteristics, Dynamics, Driving Forces and Implications for Sustainable Forest Management: A case study on forest resources tenure system in Thua Thien - Hue Province, Vietnam

10/01-09/04

ZEF

Vietnam

Role of *Pythium Aphanidermatum* in Death of Tomato Plants in Hot, Wet Season and its Biological Control

10/00-09/03

ZEF in cooperation with the Asian Vegetable Research and Development Centre (AVRDC)

Vietnam

Sustainable Nutrient Management of Intensive Rice-Based Cropping Systems on Degraded Soils in the Red River Delta of Vietnam

10/00-09/03

ZEF in cooperation with the National Institute for Soils and Fertilizers (NISF), Hanoi, Vietnam, IRRI

Vietnam

Nutrient Limitations and Growth and Fruit Production of Mayan Tree Species in Degraded Land in Yucatán, Mexico

10/01-09/04

ZEF in cooperation with Universidad Autonoma de Yucatán

Mexiko

Oil Palm and Forest Plantation for Greenhouse Gas Mitigation

10/01-09/04

ZEF in cooperation with the Samarinda University, IOPRI –Medan

Indonesia

Integrated Nitrogen Management in Rice Wheat System

10/00-09/03

ZEF

Nepal

Soil Fauna in Rainfed Paddy Field Systems: Their Role in Organic Matter Decomposition and Nitrogen Turn-over

7/99-12/02

ZEF

Indonesia

Ecosystems in a Development Context

Secondary Forests and Fallow Vegetation in the Eastern Amazon Region – Function and Management

09/91 – 08/03

SHIFT Program of BMBF (Bonn) and CNPq (Brazil), (Project 25)

Brazil

Analysis of the Carbon Pools and Human Impacts in the Yala Swamps: A Landscape Approach

2001-2003

ZEF

Kenya

Wetlands – Global Inventory and Their Role in the Carbon Cycle

2001-2002

ZEF/IFU

Global

Human Impacts on Keystone Ecosystems for Conservation *Coffea Arabica* Genetic Pool

10/00-09/03

ZEF in cooperation with the Alemaya University of Agriculture, Ethiopia

Ethiopia

An Ecological Appraisal of the Arrow Bamboo (*Fargesia nitida*) Community in Shennongjia National Nature Reserve: Implication for Ex-Situ Conservation of the Giant Panda in China

10/00-09/03

ZEF in cooperation with Hubei University Wuhan

China

Analysis of soil carbon pools in the Yala swamps, West-Kenya - a landscape approach

10/01-09/04

ZEF in cooperation with ICRAF

Kenya

Global Inventory of Wetlands and their Carbon Pools based on Vegetation and Soil maps"

05/01-09/04

ZEF in cooperation with the Institute for Meteorology and Climate Research - Atmospheric Environmental Research-Center Karlsruhe GmbH

Global

Effects of Protected Area Formation on Local People's Livelihood, Security and People-Wildlife Relationship. Case Study of a Protected Area in India

10/00-09/03

ZEF

India



Cooperation Partners of ZEF 2001/2002

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Alternatively, you may want to go directly to http://www.zef.de/zef_englisch/f_coop.htm.



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 European Union, Brussels, Belgium
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 Federal Ministry of Education, Science and Research (BMBF), Bonn, Germany
 Federal Ministry of Environment (BMU), Bonn, Germany
 Friedrich-Ebert-Foundation (FES), Bonn, Germany
 German Academic Exchange-Service (DAAD), Bonn, Germany
 German Aerospace Center (DLR), Bonn, Germany
 German Agency for Technical Cooperation (GTZ), Eschborn, Germany
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 International Center for Research in Semi-Arid Tropics (ICRISAT), Niamey, Niger
 International Food Policy Research Institute (IFPRI), Washington, D.C., USA
 International Labor Organization (ILO), Geneva, Switzerland
 International Rice Research Institute (IRRI), Los Baños, Laguna, Philippines
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 World Bank



The Society of the Friends for Development Research ZEF e.V.

The Society of the Friends for Development Research was founded to build a network of experts in order to promote the exchange of scientific knowledge and practical experiences at ZEF. The overall objective of the Society is the fostering of knowledge and understanding of development research and development policy. The members of the Society are internationally experienced scientists, politicians, entrepreneurs, and developmental practitioners from Germany who are already retired. All members committed themselves to share their profound knowledge and experiences with ZEF staff, especially with the new generation of academics at ZEF.

Members of the board are Prof. Joachim von Braun, Prof. Paul Vlek, the former ambassador Alexander Graf York, and Hans Hack (manager).