

# Ecoregions, State Sovereignty and Conflict

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## 1. Introduction

In photographs taken from space, the diversity of the Earth's ecosystems can be distinguished as a mosaic of greens, blues, browns and white. The blue of the ocean gives way to terrestrial colors: deserts shade into grasslands, grasslands into forests, and forests into tundra or snow. Regional-scale ecosystem units – or ecoregions for short – have a visible reality. But the political boundaries of state territories are invisible from space. If they could be seen, superimposed on the ecological and geographical mosaic, perhaps there would be more recognition of the frequent incongruity between political and ecogeographical boundaries. In some cases, several states occupy parts of a single ecoregion; in other cases, states encompass more than one ecoregion. This paper explores some of the consequences of incongruities between the natural boundaries of ecosystems and the political borders of states.

I argue that this mismatching has the potential to stimulate conflict, and that mapping such incongruities can be a tool for predicting conflicts in time for preventive action. I also argue that preventing ecologically rooted conflicts requires some modification of state sovereignty. A beginning has already been made, especially in the direction of constraining some aspects of state sovereignty by international agreements in order to address regional or global environmental problems. More efforts are needed in the as yet neglected direction of de-

centralizing state sovereignty in order to resolve ecologically rooted conflicts.

## 2. Ecoregions

Fourteen major types of ecosystems, or biomes, can be recognized on land (Fig. 1). The Udvardy classification scheme used in Fig. 1 divides terrestrial ecosystems into 207 biogeographical provinces; in the marine realm about 40 faunal provinces are recognized.<sup>1</sup> Another recent classification scheme recognizes regional-scale ecosystem units, or 'ecoregions'.<sup>2</sup> These biogeographical provinces or ecoregions vary greatly in photosynthetic energy capture, species diversity, and extent.

Ecoregions or biogeographical provinces are reflections, in communities of organisms, of the physical parameters of climate, soil, and topography. They are a major basis for the designation of an 'ecogeographical region',<sup>3</sup> although this concept includes a stronger geographical component, emphasizing river basins and regional seas as natural units.<sup>4</sup> Another term perhaps closer in meaning to ecogeographical region than to biogeographical province or ecoregion is 'bioregion'.<sup>5</sup>

The boundaries between ecogeographical regions, although they are not sharp, nevertheless have considerable biological reality. As Westing has noted, 'An ecogeographical region functions to some considerable extent independently of the regions contiguous to it, of more distant regions, and of the globe as a whole'.<sup>6</sup>

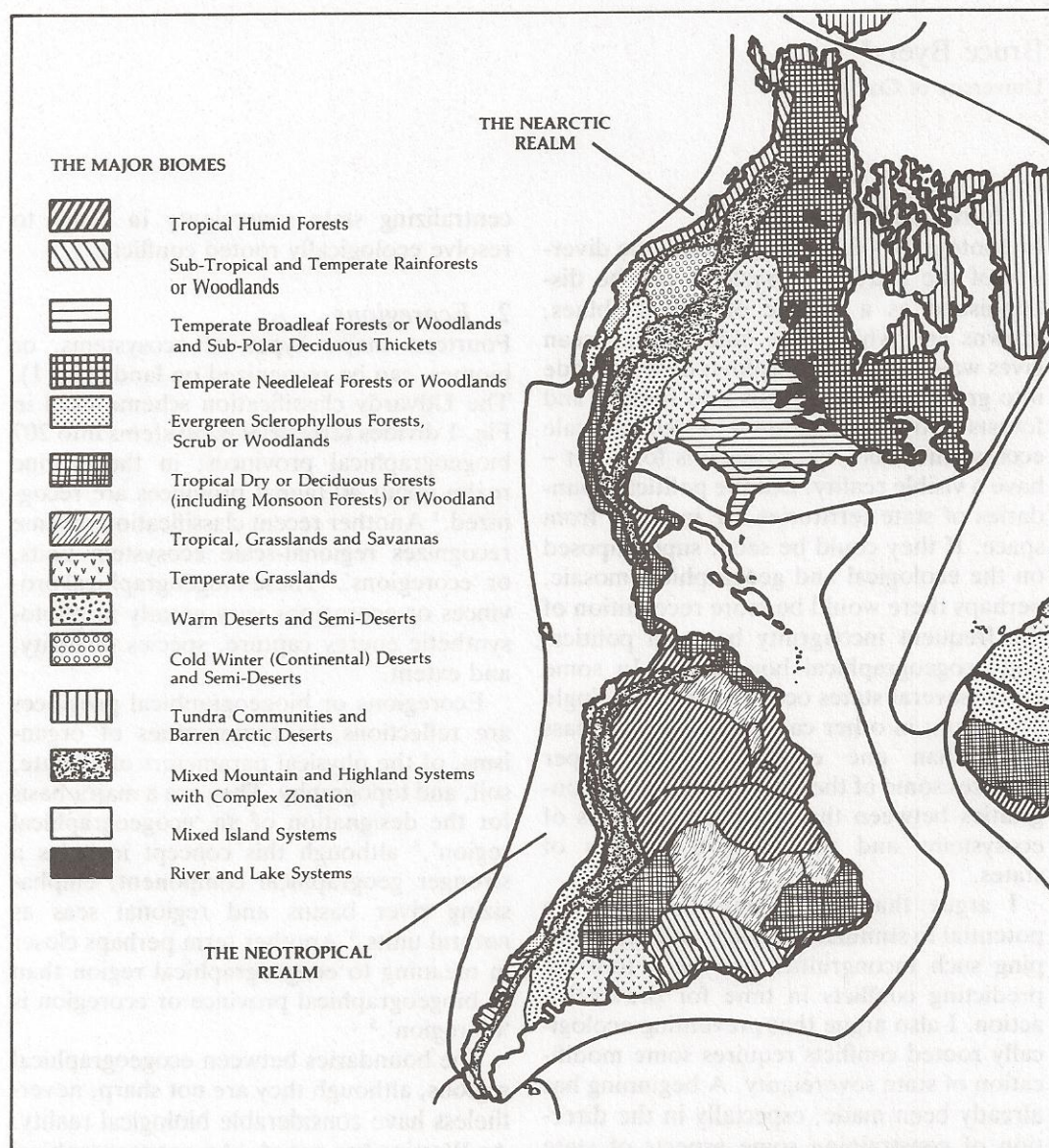
## 3. State Territories

The world is divided into about 168 sovereign political states. Some of these are

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Fig. 1. Major Ecosystems of the World. Areas demarcated by lines within continents indicate separate biogeographic provinces. Biogeographic provinces are subdivisions of biological realms.



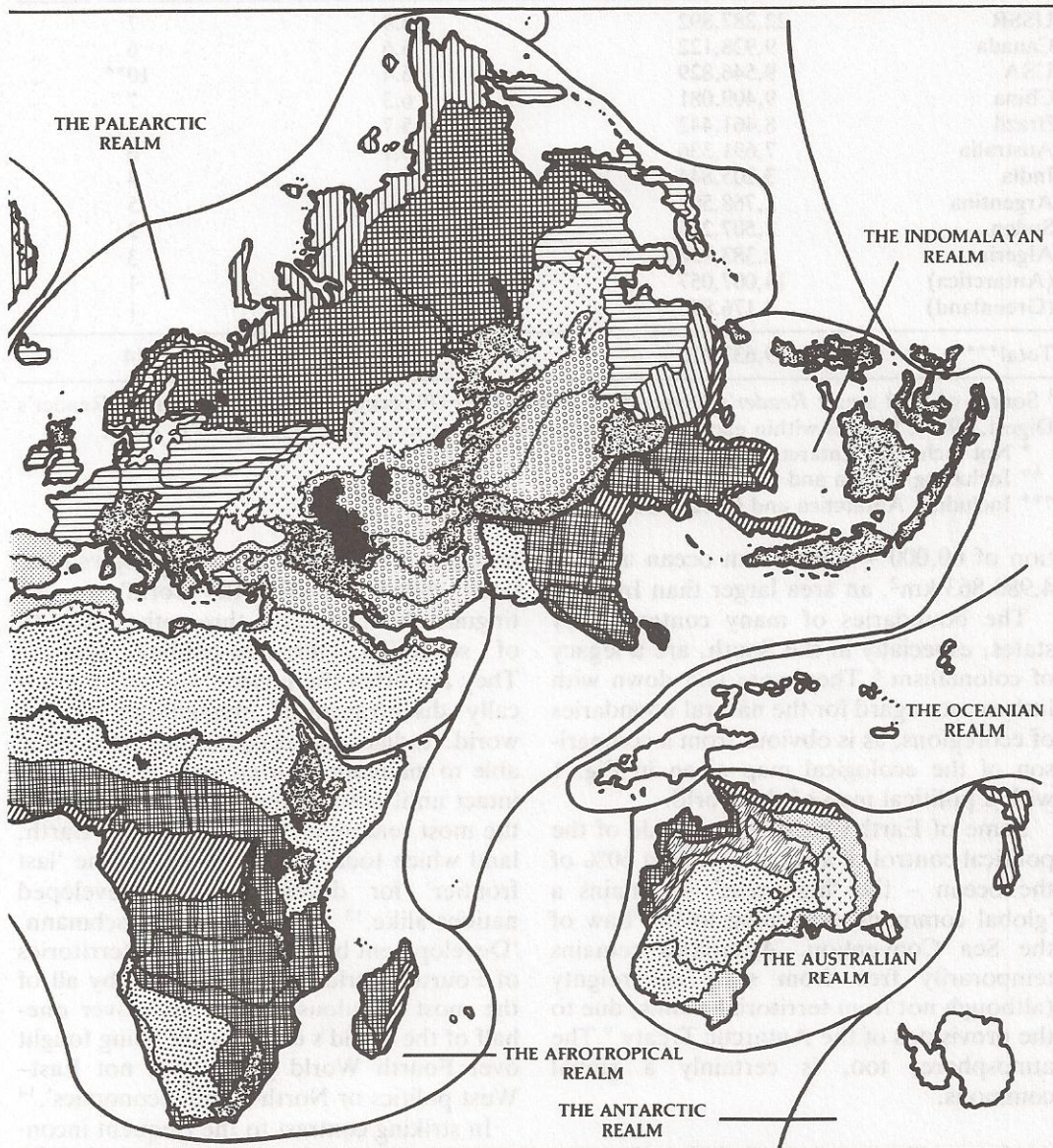
Source: Walter V. Reid & Kenton R. Miller, *Keeping Options Alive: The Scientific Basis for Conserving Biodiversity* (Washington, DC: World Resources Institute, 1989), pp. 74–75, used with permission.

geographical superstates, holding huge territories. The six largest states (Table I) control 45% of Earth's land surface; the ten largest control 52%!

In addition to these land territories, the Law of the Sea Convention of 1982 gives coastal nations limited sovereignty over 'exclusive economic zones' (EEZs) extend-



Fig. 1 (contd)



ing 370 km from their shores, so about 40% of the oceans are included in state territories. An interesting development resulting from the Law of the Sea Treaty is that some

island states have huge marine 'territories', or EEZs. For example, the Pacific island state of Kiribati – made up of 33 islands with a total land area of 819 km<sup>2</sup>, and a popula-



Table I. Largest States and Their Ecological Diversity.<sup>1</sup>

State	Land area (km <sup>2</sup> )	Percent of total land area*	Number of biomes
USSR	22,287,892	14.9	7
Canada	9,928,122	6.6	6
USA	9,546,829	6.4	10**
China	9,409,081	6.3	7
Brazil	8,461,442	5.7	4
Australia	7,691,336	5.1	6
India	3,205,844	2.1	4
Argentina	2,768,502	1.9	5
Sudan	2,507,276	1.7	2
Algeria	2,383,130	1.6	3
(Antarctica)	14,007,057	9.4	1
(Greenland)	2,176,870	1.5	1
Total***	149,633,210	100.0	14

<sup>1</sup> Source of land areas: *Reader's Digest Wide World Atlas* (Pleasantville, NY & Montreal: Reader's Digest, 1984); biomes within each state visually determined from map reproduced in Fig. 1.

\* Not including Antarctica and Greenland.

\*\* Including Alaska and Hawaii.

\*\*\* Including Antarctica and Greenland.

tion of 60,000 – controls an ocean area of 4,980,863 km<sup>2</sup>, an area larger than India!<sup>7</sup>

The boundaries of many contemporary states, especially in the South, are a legacy of colonialism.<sup>8</sup> They were laid down with little or no regard for the natural boundaries of ecoregions, as is obvious from a comparison of the ecological map given in Fig. 1 with a political map of the world.

Some of Earth's surface is outside of the political control of any state. About 60% of the ocean – the 'high seas' – remains a 'global commons' according to the Law of the Sea Convention. Antarctica remains temporarily free from state sovereignty (although not from territorial claims) due to the provisions of the Antarctic Treaty.<sup>9</sup> The atmosphere, too, is certainly a global commons.

#### 4. States, 'Nations', and Cultural Boundaries

Although there are about 168 sovereign states, there are far more ethnic groups or 'nations'<sup>10</sup> – probably somewhere around 5,000.<sup>11</sup> It is therefore obvious that many ethnic nations do not have sovereignty over any territory, or they may have only limited sovereignty over 'reservations' or 'tribal

homelands'. These indigenous peoples have been called the 'Fourth World' to distinguish them from the three other 'worlds' of sovereign, territory-holding states.<sup>12</sup> They are often the poorest and most politically disenfranchised populations in the world. Indigenous peoples that have been able to maintain their cultures more or less intact until now frequently occupy some of the most remote or harshest land on Earth, land which today often represents the 'last frontier' for developing and developed nations alike.<sup>13</sup> According to Nietschmann, 'Development by invasion [of the territories of Fourth World nations] is done by all of the most populous states', and 'over one-half of the world's conflicts are being fought over Fourth World geography, not East-West politics or North-South economics'.<sup>14</sup>

In striking contrast to the frequent incongruities between the boundaries of states and bioregions is the frequent correspondence between the borders of cultural nations and bioregions. This congruence undoubtedly exists because pre-industrial human cultures were finely adapted to specific biomes.<sup>15</sup> Because the many current state boundaries were created by colonial powers, and not by local inhabitants, it is



not surprising that they often ignore both cultural and ecological boundaries. However, cultural geography is certainly complex, and the patterns of association between cultural and ecogeographical regions are not always clear.<sup>16</sup> As Clay and Holcomb state: 'The association of peoples with specific ecological niches is an enduring feature of regional dynamics that is often overlooked or even misconstrued.'<sup>17</sup>

### 5. *Incongruities Between States and Ecogeographical Regions*

There are two types of incongruities between the boundaries of states and ecoregions: either a single ecoregion can be shared by two or more states, or a single state can encompass more than one ecoregion (see Table I). The latter type of incongruity has been seriously neglected in the recent literature on environmental management and ecological security. It is this type that will be emphasized here.

#### 5.1 *Ecoregions Shared by States*

Two or more states often divide a single ecogeographical region or ecoregion. In these cases, conflict may arise over the apportioning of the natural resources of the region, or over transboundary pollution. International river conflicts fit into this category.<sup>18</sup> Ecogeographical 'regions' or resources that are global commons – the atmosphere, ozone layer, high seas, and Antarctica – present limiting cases of this situation. The need to modify state sovereignty when it is too geographically limited to manage a resource has been widely recognized in the literature.<sup>19</sup>

Conflict is also often exacerbated in these cases because of the association between ecoregions and ethnic groups – dividing an ecoregion often puts a single ethnic group under the control of two or more states. The Azeris, found both in the Azerbaijan SSR and in the adjacent region of Iran, provide one example. In the Horn of Africa, an ecoregion characterized by desert and arid grassland wraps around the Ethiopian highlands, extending from eastern Sudan and

Eritrea into Kenya (see Fig. 1). This is an ecosystem best suited to nomadic pastoralism; and the Somali ethnic group, for example, has developed a distinctive 'camel complex' that skillfully exploits this arid region.<sup>20</sup> The part of this arid ecoregion inhabited by Somali people is now divided among four states – Ethiopia, Somalia, Djibouti, and Kenya – the result of borders created by European colonial powers and the former Ethiopian Empire. This has created a situation for the Somali that is the subject of a book with the apt title, *Somalia: Nation in Search of a State*.<sup>21</sup>

#### 5.2 *States With More Than One Ecoregion*

Single states often occupy more than one ecogeographical region. While most common in the geographically large superstates (Table I), it is not uncommon even in much smaller states. In contrast to the sharing of an ecoregion by more than one state, this kind of situation has hardly been mentioned in the recent literature.

Conflict can be stimulated in such a situation for two reasons. First, multi-ecogeographical states are frequently multi-ethnic states, and some ethnic groups within a state are often politically weaker than others, often lacking sovereignty over the territories they occupy. Second, even if different ecoregions are ethnically homogeneous, they often support populations of very different densities. In a state where political power is based on proportional representation, such power is often differentially distributed among ecoregions. A more populous region may have the power to control the resources of other regions. These kinds of political imbalance often lead to the exploitation of the resources of one ecogeographical region for the benefit of people who live elsewhere – a kind of intra-state colonialism. In some cases the region can be so overexploited and degraded as to warrant calling it a 'national sacrifice area'.<sup>22</sup>

Examples from some of the geographically large states include: the 'national sacrifice area' in the 'Four Corners' area of the



USA;<sup>23</sup> the degradation of the Aral Sea region in the USSR;<sup>24</sup> the transmigration of large numbers of people from Java to Irian Jaya, the Indonesian-controlled western half of the island of New Guinea;<sup>25</sup> the hydropower schemes on the Ganges and the Narmada Rivers in India;<sup>26</sup> and the exploitation of the Amazon region by the state of Brazil.<sup>27</sup>

Sri Lanka provides one example of this kind of conflict in a small state. It has a 'wet zone', centered in the southwest, and a 'dry zone', located in the east and north. The wet zone is inhabited mainly by Sinhalese, while most of the Tamil ethnic group live in the dry zone. Sinhalese dominate the state government. Government-sponsored water projects in the dry zone benefited mainly the Sinhalese, many of whom resettled in areas occupied mainly by Tamils. This ecogeographical situation is one of the complex roots of the civil war in Sri Lanka.<sup>28</sup> Another example is the conflict over the forest resources of Sarawak in Malaysian Borneo.<sup>29</sup>

The Horn of Africa also provides clear examples of conflict in multi-ecoregional states. Ethiopia, Sudan, and Kenya encompass more than one ecoregion (see Fig. 1), and these ecoregions are inhabited by different ethnic groups. Clay and Holcomb succinctly describe the situation within Ethiopia:

Most general introductions to Ethiopia indicate that its surface consists of three major topographical regions – the lowlands and two types of highland areas. What is normally omitted from such descriptions is that the ecological regions . . . are also largely inhabited by distinct groups of peoples. Semitic highland agriculturalists – the Abyssinians (including Amharas and Tigrayans) – occupy the high, cold regions found mostly in the northern half of the Ethiopian plateau. Mostly Cushites – the largest Cushitic groups are the agricultural and agro-pastoral Oromo and Sidama – inhabit the lower highland areas of the empire which range from temperate to subtropical. Other pastoral Cushitic groups, such as the Somalis in the east, and also Nilotic peoples in the west, inhabit the hot, dry,

lowland areas within Ethiopian boundaries as well.<sup>30</sup>

When ecological imbalances within ecoregions cause movements of people, conflict can be stimulated. In Somalia, the drilling of wells and an increase in commercial pastoralism for the export market has resulted in human population growth, overgrazing and desertification.<sup>31</sup> In Ethiopia, forest cover declined from 40% at the turn of the century to only 4% by 1988, and severe soil erosion has reduced agricultural production.<sup>32</sup> Large numbers of peasants have left the highlands, often settling in more arid lower regions where they compete for land with the indigenous, ethnically different population, and add further stress to already fragile ecosystems.<sup>33</sup> It is during droughts especially that unsustainable ecological relations in the region manifest themselves in famines and movements of refugees. Since 1970, about 5 million Ethiopians are believed to have been displaced out of a population of about 30 million. By 1980, one-sixth of the population of Somalia were refugees. More than one million refugees from Ethiopia now live in neighboring Sudan, and at least a million in Somalia. Several hundred thousand Sudanese are estimated to have fled to neighboring countries, and millions to have been internally displaced.<sup>34</sup> The conflict-stimulating potential of such massive numbers of refugees is obvious.

## 6. *Ecoregional Self-sufficiency and Ecological Security*

The World Commission on Environment and Development defined 'sustainable development' as economic activity and development that does not overexploit bioregions in such a way that future generations inherit a depleted environment.<sup>35</sup> In ecological terms, sustainable development means that we humans must not exceed the carrying capacity of our ecoregions or biosphere.

'Carrying capacity' can be defined as the maximum population that can be indefi-



tely sustained in a given area – that is, without changing the ecosystem in ways that will eventually reduce the sustainable population. This is not a static condition, but one of dynamic stability and balance. Another description of carrying capacity would be a balance between population and resources. Food, water, and energy are probably the three most critical resources in this context. Many ecologists argue that any human-caused ecological degradation in any part of an ecosystem is evidence, at least locally, that carrying capacity has been exceeded.

Ecoregions, because they are quite ecologically homogeneous, are natural units in which to assess carrying capacity by monitoring ecological degradation, and in which to attempt to maintain self-sufficiency in basic ecological resources.

Population-environment imbalance, especially in the poor countries of the South, often creates 'environmental refugees', as people whose governments cannot or will not help them move in search of the resources they need. As such refugees move into other ecoregions, they often interact and compete with people from different ethnic groups. In such cases the cultural differences have a tremendous potential to organize and exacerbate conflict that fundamentally concerns ecological resources.

A number of authors have pointed out the link between ecological security and sustainable development.<sup>36</sup> Westing writes: '... once the local peoples and nations recognize the unfailing necessity of dealing with their security problems within the context of their *ecogeographical* region, ... then their highest priority will be to bring regional resource availabilities into balance with regional resource utilization levels.'<sup>37</sup> This could be thought of as a general principle of ecological security.

### 7. Predicting Ecologically Rooted Conflicts

Gebremedhin et al. state that '... a plea must be made for preparing an inventory of potential environmental hot spots and for the structuring of continuing exchanges of

information and perhaps even of joint management'.<sup>38</sup> This plea recognizes the fact that once an ecologically rooted conflict begins, it takes on a life of its own, often preventing the cooperation necessary to treat its causes.

The foregoing analysis suggests a way to predict areas of potential environmental conflict. If the analysis has merit, such conflicts should often be found: (1) where ecogeographical and state boundaries do not coincide, and (2) particularly where the carrying capacity of a region has been exceeded (and this especially in poor countries that cannot afford to import basic resources). Many of the hot spots predictable in this way – such as Sri Lanka, the Indus basin, the Middle East, and the Horn of Africa – in fact already have active conflicts.

### 8. Conclusion

Having presented an argument about some causes of ecologically rooted conflict, let me now suggest relevant policies to resolve such conflicts and enhance ecological security.

First, the predictive hypothesis or model contained in the foregoing analysis could prove useful for identifying areas likely to be hot spots for ecologically rooted conflict, and for taking remedial action before conflict develops. United Nations agencies such as the UN Environment Programme (UNEP), UN Food and Agriculture Organization (FAO), and UN Development Programme (UNDP) could organize a system to monitor environmental degradation and promote corrective action in areas where ecosystems are being damaged – a sort of ecological-security early warning and response system.

On the basis of the foregoing analysis, two kinds of policy recommendations can be made: (1) state sovereignty should be modified, although not abandoned, in order to recognize ecogeographical realities; and (2) basic resource self-sufficiency of bioregions should be encouraged and developed. These two policies are complementary and mutually reinforcing.



The need to modify state sovereignty through international agreements in the cases where ecogeographical regions or resources are shared among states has been widely discussed.<sup>39</sup> Nincic has stated that: 'While circumscribing certain attributes of sovereignty, membership in an international organization may – and as a rule does – create conditions for the fuller exercise of other attributes of the self-same sovereignty and thus increases the "effectiveness" of sovereignty as such, even if in a new and different form.'<sup>40</sup> This is a kind of 'sovereignty bargain' in which some obligations that limit state sovereignty are voluntarily accepted in order to enhance the effectiveness of sovereignty. Most authors agree that this kind of sovereignty bargain will be necessary, to a greater or lesser degree. Piddington, however, argues that to try to resolve international environmental problems 'by creating new mechanisms and imposing restrictions on sovereignty could, on the other hand, lead to an exacerbation of existing problems'.<sup>41</sup> Formal international agreements that involve such international sovereignty bargains are the Antarctic Treaty, the Law of the Sea, and the Montreal Protocol; future agreements to protect the atmosphere and biodiversity will also require such sovereignty bargains.

The UN system has played a central role in encouraging and facilitating the modification of state sovereignty, a subject that must be handled with great sensitivity and diplomacy. It must continue to do so.

The World Charter for Nature of 1982, supported by 112 members of the UN General Assembly, is interesting in this regard. It states that all of Earth's ecosystems, as well as land, marine and atmospheric resources, 'shall be managed to achieve and maintain optimum sustainable productivity'.<sup>42</sup> The Charter is ambiguous – perhaps deliberately so – about the exact locus of sovereignty. Although it acknowledges state sovereignty over natural resources, it then suggests that states do not have the right to exploit them in an unsustainable way, and that they must follow the

other provisions of the Charter, cooperating with other states in order to do so. If upheld, the provisions of the World Charter for Nature would preclude 'national sacrifice areas', transboundary pollution, unsustainable development, and most other sources of ecological insecurity.

UNEP has pioneered the path toward some formal agreements for regional environmental cooperation through its Regional Seas Program. Sustainable development of common resources has increasingly been a part of action plans for regional seas; 'in several regions the program has managed to bring antagonistic nations to the bargaining table and to achieve agreement among them on regional environmental issues in spite of their otherwise hostile relations'.<sup>43</sup> Some international river agreements provide hopeful models of cooperation also.<sup>44</sup>

Gebremedhin has pointed out that 'the transboundary nature of the [regional] sea itself seems to be conducive to cooperation'. The regional seas model needs to be adapted for terrestrial ecogeographical regions, where traditional attitudes about state sovereignty over territory seem to make cooperation more difficult.

In the Horn of Africa, the Intergovernmental Authority on Drought and Development (IGADD) is a fledgling institution with great potential for building regional environmental cooperation. Djibouti, Ethiopia, Kenya, Somalia, Sudan, and Uganda are the members of IGADD, which met for the first time in February 1985. With encouragement from UNEP and other organizations, IGADD could grow into the kind of organization necessary to resolve the ecologically rooted conflicts of the region and stimulate cooperation toward ecologically sustainable development. This is a very hopeful model for many other regions also, and it should be strongly supported.<sup>45</sup>

Not enough attention has been given to the cases where one state encompasses more than one ecoregion, nor to the association between ecoregions and ethnic groups. Discussing problems of sovereignty and multi-ethnic states, Boulding writes:<sup>46</sup>



Since ethnic groups are solving social and economic problems that central governments have been unable to deal with, the next developmental stage would appear to be a devolution of governmental power, passing it on to groups that are competent at the local level, with an accompanying willingness on the part of local groups to cooperate within an administrative system that gives them more recognition. The process has already begun, assisted by INGOs that are focused on grassroots development.

Indigenous cultural groups, prior to their disruption by colonialism at least, often lived in population-resource balance with their environments, and maintained a vast reservoir of traditional ecological wisdom about living sustainably within their ecoregions.<sup>47</sup> This indigenous, traditional knowledge, if it has not been lost, can be used to solve the 'social and economic problems' of how to live sustainably within ecoregions – problems that central governments of modern states have generally been unable to solve. Eventually the community of states may come to regard the diversity of human culture, and their traditional ecological knowledge as a 'global common resource', worth protecting by international agreement.

Alliances between indigenous peoples and environmental international non-governmental organizations (INGOs) that attempt to preserve both the cultures and the ecosystems they occupy are occurring, as Boulding says; and such alliances foster the process of decentralization of sovereignty. For example, the indigenous people of Sarawak have allied with Sahabat Alam Malaysia, an affiliate of the INGO Friends of the Earth, in an attempt to halt logging in their territory.<sup>48</sup> At a recent meeting in Iquitos, in the Peruvian Amazon, many environmental INGOs met with a coalition of Amazonian tribes. The 'Iquitos Declaration', issued at the meeting, recognizes the claims of indigenous peoples to own and to manage their own territories.<sup>49</sup>

Once again, the UN system could take a leading role in tactfully encouraging and

skillfully facilitating a decentralization of state sovereignty along ecoregional lines. Some of this may be set in motion by the UN Working Group on Indigenous Populations.<sup>50</sup> Perhaps what is ultimately required is a 'reconstituting' or 'refederalizing' of multi-ecogeographical states to allow limited sovereignty or autonomy for ecoregions and the ethnic groups that inhabit them.<sup>51</sup>

Sovereignty bargains, in which a state gives up some measure of control over its constituent bioregions and 'nations', might actually increase the overall effectiveness of state sovereignty, just as in those cases that involve relinquishing some aspects of sovereignty in international agreements. The effectiveness of the government of Ethiopia, for example, is currently rather questionable, as significant parts of Ethiopia are in the control of various rebel fronts. Its effective sovereignty would probably increase if it struck a sovereignty bargain and agreed to relinquish some measure of control of certain portions of its territory. The same might be true in Brazil, where the Iquitos Declaration seems to make exactly this demand of the state government.

In each case, sovereignty should be modified according to the principle of 'subsidiarity': 'Simply stated: whatever can be managed at the local level should be. Only when a problem exceeds the competence of a particular locality should it be taken up by a larger social structure.'<sup>52</sup> This same principle is reflected in Gebremedhin et al.: 'environmental problems must be responded to at the spatial level at which they occur.'<sup>53</sup> Sovereignty bargains will have to be made at *all* levels of the 'ecopolitical hierarchy' – local, subnational, national, multilateral, and global<sup>54</sup> – in order to build institutions that can resolve ecologically rooted conflicts and create ecologically sustainable development.

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