20. MOUNTAIN, FOREST, AND POLAR ECOSYSTEMS

I. Introduction

1. Ecosystems require preservation and protection from human interference that might harm and adversely affect their vital functions. This chapter focuses on three examples that illustrate the unique demands that ecosystems place on efforts at protection and preservation: mountain ecosystems, forest ecosystems and polar region ecosystems. Each of these types of ecosystems is comprehensively examined in a self-contained part, virtually as a sub-chapter. Each type of ecosystem displays significant differences in the composition of the communities that comprise them, the differences in the vital functions they perform, and the importance of these functions to nature and to human beings. In each case, many or even all of the plant or animal species or organisms are unique to the relevant environment. These differences notwithstanding, all these ecosystems have in common the geographic and climatic features that support communities of plants, animals, and other mutually dependent organisms. They all perform certain vital functions that are dependent upon the community remaining largely intact.

2. A growing understanding of the unique features and protective demands of ecosystems has prompted the making of ecosystem-oriented laws at international and national levels. Notably, ecological systems, processes, and regions often do not overlap with political boundaries and protective efforts have the potential to clash with individual states' concerns regarding sovereignty over their territories or natural resources. In response to these challenges, certain international environmental law principles and concepts, including the concept of sustainable development and the precautionary principle, have developed. Many of the principles and concepts applicable to the protection and management of ecosystems are discussed in detail in chapter 3 of this Manual.

3. Alongside the development of international environmental law principles and concepts, various treaty-based legal regimes for the protection of ecosystems have emerged. While some treaty regimes incorporating ecosystem-oriented management principles and concepts have a broad approach to environmental issues concerning, for example, protection of the marine environment and biodiversity protection, only a small number of regimes actually aim to govern entire ecosystems. The scope of the existing legal regimes depends partly on the urgency of the ecological concerns at hand, the perceived importance of the threatened ecosystem and the extent to which ecosystem protection and management implicate state sovereignty.

II. Mountain Ecosystems

1. Ecosystem Characteristics and Vulnerabilities

4. Webster's New Collegiate Dictionary describes a mountain as a landmass that projects conspicuously above its surroundings and is higher than a hill. Mountains are found on every continent and cover 26% of the Earth's surface. Because of their physical and ecological characteristics, mountains perform crucial ecological functions and provide many benefits to humans. For example, many mountains originate from volcanic activities, which, during formation, lead to an outpouring of lava on the outer surface of the mountains. Over time, the lava and rock particles develop into rich volcanic soils that support the growth of many plants and trees that develop into forests that are home to diverse species of animals, plants and other organisms.

5. Mountains have also become the water towers of humanity. Because air ascends mountains, cools, condenses and falls as rain, mountain areas usually receive more rainfall than low-lying areas. This is one of the reasons many rivers, including trans-boundary ones, originate from mountains and mountain ranges. Many of these rivers play important roles in supporting regional economies. For example, the Indus River, which originates from the Himalayan Mountains, supports rice irrigation for more than 130 million people in Pakistan alone and flows through India and Bangladesh, supporting the world's largest irrigation network. In Central America, the entire economic development of the Atacama Desert area depends on small streams that originate from the Andes Mountains. In Europe, the Alps supply water to major European rivers including the Rhine, Rhone, Danube and the Po. In Eastern Africa, the Mara River, which is the only permanent water source in Northern Tanzania and supports millions of diverse species of wildlife in the Serengeti, originates from the Rift Valley mountain ranges in Kenya. All the major rivers in the world,

from the Rio Grande to the Nile, have their headwaters in mountains. As a consequence, more than half of the world's population rely on mountain water to grow food, produce electricity, sustain industries and, most importantly, to drink.

6. In addition, because of their topography and aesthetic beauty, mountains are increasingly popular destinations for tourism, the world's biggest industry. In the Alps, there has been a steadily growing two-season tourism since the 1950s. Mountains can also be reservoirs of a number of precious minerals. In the United States' Rocky Mountains, for example, there are substantial traces of silver, cadmium, zinc, and other minerals that are in high demand. Mountains are also home to much of the world's population, especially in mountainous countries such as Kyrgyzstan, Kazakhstan, Tajikistan, and the Carpathian region of Europe, which contains more than sixteen million people.

7. The pressures on mountain ecosystems are manifold. They are very fragile because of their steep slopes, high altitude and other attributes. In many regions, human activities are threatening to destroy them and to seriously undermine their ability to perform ecological functions and provide benefits to humans.

8. Human factors such as population pressure, combined with natural hazards such as climate change, have pushed poor agricultural practices ever higher up the mountains, especially in countries that are largely mountainous. In many regions, many health problems in mountain wildlife and in people living downstream have resulted. Mountain forests have been cut down and the areas cultivated, prompting cycles of deforestation, soil erosion, downstream flooding, water flow changes and pollution of rivers with agricultural chemicals. Availability of minerals on some mountains has also led to heavy mining activities, resulting in the pollution of the headwaters of many rivers, including those that flow through more than one national boundary. The resulting negative impacts on ecosystems have created disputes between countries where mining activities take place and downstream countries that experience adverse consequences. In addition, mountains have been made toxic waste dumping grounds in many places. For example, dangerous nuclear wastes have been dumped high up in the mountains of Kyrgyzstan. The wastes threaten to spill into rivers that flow into the fertile valleys below, much of which are in neighbouring Uzbekistan and are home to almost 20% of Central Asia's entire population.

9. Tourism is another human activity that is threatening to destroy mountain ecosystems. Even mountains in remote corners of the world are becoming popular destinations for tourists, with many negative results. Often, large mountain forests are cleared to create room for mountain hotels and other tourist resorts. Not only does this affect biological diversity, but also, once built, waste discharges emanate from the hotels to the sources of many rivers that originate from the mountains. In addition, tourist activities on mountains and glaciers have weakened the stability of the mountain ecosystems, resulting in avalanches, snow slides, landslides and ice slides.

10. Wars and civil strife in mountainous regions have also had severe consequences on wildlife and human populations living there. The United Nations Food and Agriculture Organization reports that many of the world's wars are being fought in mountainous regions. Recent examples include Afghanistan, Kurdistan and Kashmir, to name but a few from a long list. In these wars, explosives destroy mountain landscapes and vegetation that have been habitats for many unique species of wildlife, including endangered species.

2. International Environmental Regime relating to Mountain Ecosystems

a) Convention on the Protection of the Alps

11. The Alps are the most significant mountain areas in Western Europe, running at heights between 2,000 and 3,000 metres high and stretching across the borders of a number of countries including Switzerland, France, Germany, Italy, Austria, Liechtenstein and Slovenia. The Convention on the Protection of the Alps ("1991 Alpine Convention") makes the Alps the world's first mountain region to be legally protected at the international level.

12. The Alpine Convention was adopted on 7 November 1991, by Austria, France, Germany, Italy, Liechtenstein, Switzerland, Slovenia and the European Economic Community. The Alpine Convention came into force on 6 March 1995. As of November 2005, it has nine parties, including all of the initial signatories, plus Slovenia and Monaco.

13. The parties agreed to establish a comprehensive policy for the protection and sustainable development of the Alps in their entirety. The range of issues addressed by the 1991 Alpine Convention include: protection of the region's landscape and its diverse species of animals, plants and other

organisms, regulation of agriculture in the mountain region, mountain tourism, proper land use planning for the mountain areas, prevention of pollution of the mountain ecosystems and avoidance of competition over use of the mountains along national lines.

14. The 1991 Alpine Convention is a framework agreement, which sets out the basic principles and procedures according to which the regime is to be fleshed out, and establishes the institutions through which the parties are to cooperate. Specific obligations are contained in nine issue-specific protocols that have been adopted since 1994, to complement the 1991 Alpine Convention.

15. The 1991 Alpine Convention's substantive provisions set out a general obligation to pursue a comprehensive policy for the protection and preservation of the Alps. To this end, the parties agree in article 2(1) to apply the principle of prevention, the "polluter pays" principle and the principle of cooperation at national and international levels, after carefully considering the interests of all the Alpine states, regions and the European Community. For example, parties should take measures to ensure that manufacturing facilities and other entities that cause pollution of the Alpine environment take responsibility for cleanup and for any pollution damage.

16. Additionally, article 2(2) requires parties to take appropriate measures in eleven areas of concern that reflect an ecosystem-oriented approach: population and culture, planning for sustainable development of the region, prevention of air pollution impacting the region, soil conservation, management of Alpine water resources, conservation of nature and the countryside, regulation of farming in the mountain areas, preservation of mountain forests, regulation of tourism and recreation, control of transport through the region, consideration of energy-related matters, and waste management. For example, with respect to conservation of nature, article 2(2)(f) of the 1991 Alpine Convention obliges parties to take appropriate measures to protect, conserve, and, where necessary, rehabilitate the natural environment and the countryside. The goal is to allow ecosystems to function, to preserve animal and plants species and their habitats, to maintain nature's capacity for regeneration and sustained productivity and to preserve the variety, uniqueness and beauty of nature and the countryside on a permanent basis.

17. Also, under articles 3 and 4, the 1991 Alpine Convention requires parties to cooperate in carrying out research activities, scientific assessments, and the exchange of legal and technical information that would enable them to meet their obligations.

18. At an institutional level, the 1991 Alpine Convention creates the Alpine Conference, which meets once every two years. This plenary body is made up of representatives of the parties. It serves as a forum for the discussion of the common concerns of and cooperation between the parties. It is also responsible for examining the implementation of the convention and for making decisions regarding further development of the Alpine Convention. The regular work of the Alpine Convention is carried out by the Standing Committee, assisted by "Groups of Experts", as provided for in articles 5 through 8.

19. As already noted, the 1991 Alpine Convention requires parties to take appropriate measures to address a variety of concerns. However, the Convention does not contain detailed obligations in this respect. The necessary detail for the implementation of the 1991 Alpine Convention was to be achieved through the adoption of individual sub-agreements, or "protocols," as provided under article 2(3). Between 1994 and 2000, parties adopted nine protocols on mountain agriculture, nature protection and landscape conservation, land use planning and sustainable development, mountain forests, tourism, soil conservation, energy, transport, and dispute settlement. The Protocol on Land Use Planning and Sustainable Development, for example, requires parties to develop and implement regional plans for sustainable development. In the context of regional economic development, such plans are to be aimed at, among other things, conservation and management of important environmental and cultural areas, and reducing the risk of natural calamities. By December 2002, all of the nine protocols had come into force and parties are in the process of developing three more.

b) Framework Convention on the Protection and Sustainable Development of the Carpathians

20. The Carpathian Mountains are a range of mountains straddling the Czech Republic, Hungary, Moldavia, Poland, Romania, Slovakia and Ukraine. The Framework Convention on the Protection and Sustainable Development of the Carpathians ("2003 Carpathian Convention") was adopted on 22 May 2003. It entered into force on 4 January 2006.

21. In its Preamble, the 2003 Carpathian Convention expressly recognizes the Alpine Convention as its model. Its primary objective is the protection and sustainable development of the Carpathian Mountains region with a view to improving the quality of life of the people living there, to strengthening local economies of the region and its communities, and to conserving the natural resources thereon and the cultural values of the mountain people.

22. To meet these objectives, the 2003 Carpathian Convention sets out a number of guiding principles in article 2, including the precaution and prevention principles, the polluter pays principle, the principle of public participation and stakeholder involvement, transboundary cooperation, ecosystem approach, programatic approach and integrated planning and management of the land and water resources. The 2003 Carpathian Convention obliges parties to apply these principles in taking steps, actions, and measures on a number of matters specified in articles 4 through 13. These include conservation and sustainable use of biological and landscape diversity, landscape planning, sustainable water resource development, integrated rive basin development, and sustainable agriculture, forestry, tourism, transport, infrastructure, industry and energy. For example, on industry and energy, parties are required by article 10 "...to promote cleaner production technologies, in order to adequately prevent, respond to and remedy industrial accidents and their consequences, as well as to preserve human health and mountain ecosystems".

23. For its implementation, article 14 of the 2003 Carpathian Convention establishes a Conference of the Parties to be responsible for a number of matters, including amendments to the 2003 Carpathian Convention and adoption of protocols thereto. In articles 15 and 16, the Convention also establishes a Secretariat to be responsible for compilation and submission of reports to parties and other matters, and subsidiary bodies to provide technical assistance. Parties shall settle disputes arising from the interpretation or implementation of the Carpathian Convention by negotiation and by other means that are in accordance with international law as provided by article 20.

c) Non-Legally Binding Instruments

24. Agenda 21 is one of the instruments that, although non-legally binding, has produced practical results with respect to protection of mountain ecosystems. It sets a plan of action and measures that representatives of 180 governments agreed to take on various areas of environmental conservation. With respect to protection of mountain ecosystems, its Chapter 13 is the most relevant.

25. In Chapter 13 of Agenda 21, UNCED recognised that the world's mountains have significant natural resources, provide essential ecological goods and services to humans, and therefore, should be preserved, restored and sustainably managed. Fresh mountain water conservation, conservation of biological diversity in mountain areas, conservation of mountain forests, and prevention of negative impacts of climate change on mountains and sustainable tourism are some of the mountain issues that were identified as requiring conservation actions. The representatives of governments agreed to raise awareness of mountain people on these issues and to support their efforts to prevent, reduce and reverse the trend of degradation of mountain ecosystems. They also agreed to provide mountain people with alternative livelihoods to avoid over-exploitation of mountain resources and to undertake other programmes to address mountain issues.

26. On the basis of Agenda 21, a number of actions have been taken, including creation of agreements that specifically address mountain ecosystem issues in specific regions. For example, parties to the Framework Convention on the Protection and Sustainable Development of the Carpathians expressly stated in the Preamble to the Convention that they recognized the importance of and were acting pursuant to mountain issues highlighted in Chapter 13 of Agenda 21.

27. Agenda 21 has also stirred a number of non-governmental organization initiatives for protection, preservation and sustainable development of mountain areas, including:

- Charter for the Protection of the Pyrenees of 1995, whose objective, inter alia, is to preserve the mountain range's ecological values;
- African Mountains and Highlands Declaration of 1997, which highlights major problems affecting Africa's mountain ecosystems and provides policy recommendations to address them;
- Kathmandu Declaration of 1997, which calls for, *inter alia*, effective protection of the mountain environment and respect for the culture and dignity of mountain peoples; and
- Draft World Charter of June 2000, which sets out conditions that are crucial to meeting the needs of mountain populations while preserving their environment.

28. There are also many examples of non-legally binding instruments that were developed through governmental fora pursuant to Chapter 13 of Agenda 21, with much input by Non-Governmental Organizations. These include the Cusco Declaration on Sustainable Development of Mountain Ecosystems, which was drawn up by representatives of eighteen countries from various continents gathered in Cusco, Peru, in 2001. In their deliberations, parties identified sustainable mountain development as one of the mountain issues requiring careful consideration, and recognized that social and economic measures are necessary in addressing the issues.

29. Since the adoption of the Alpine Convention in 1991 and the inclusion of Chapter 13 on mountain ecosystems in Agenda 21, binding and non-binding instruments focusing on the protection and sustainable development of mountain areas have proliferated. This trend is indicative of a growing recognition that the delicate balance between ecological and developmental needs requires comprehensive, ecosystem-wide approaches. Although ratification and implementation remain works in progress, the Alpine Convention is the most advanced legal regime for mountain protection so far. It is a landmark agreement and provides a solid basis for transboundary collaboration. Recent developments regarding other mountain areas suggest that this framework convention may be a suitable model for the gradual evolution of legal regimes, and for the tailoring of regimes to the specific concerns of a particular mountain region. Work is underway to develop comparable agreements for the Altai Mountain range involving Kazakhstan, Mongolia, and Russia, and the Caucasus Mountain range involving Armenia, Azerbaijan, Georgia and Russia.

3. National and Local Initiatives relating to Mountain Ecosystems

30. Legislative protection of mountain ecosystems is an area that is still developing and only a few countries have passed laws, rules, standards and policies that specifically deal with mountain issues. While relevant legislation exists in various countries, this section of this chapter is limited to laws related to the Alpine Convention in order to illustrate how that particular agreement is being implemented.

31. Although France, Italy, Austria and other parties to the 1991 Alpine Convention have laws or policies that address issues related to mountain ecosystems, Switzerland is particularly illustrative, since most of its territory is mountains. For Switzerland, national implementation of the 1991 Alpine Convention and the protocols did not require any additional legislative measures because it already had in existence a number of laws at different levels of government addressing mountain agriculture, social and sustainable development of mountain areas, mountain tourism, infrastructure and other issues covered by the 1991 Alpine Convention. When Switzerland became a party to the 1991 Alpine Convention, it gave its commitment to improve its existing mountain legislation where necessary. Switzerland does not have a single, unitary piece of legislation that covers its mountain ecosystems. Instead, it has a number of laws covering various issues concerning protection and sustainable development of mountain areas, which tend to link the protection of mountain ecosystems with the right of the people to adequate economic development. Some of these laws include:

- *The Federal Law on Assistance regarding Investments in Mountain Areas.* This is the main sectoral legislation, also called Swiss Mountain Law of 1974. It was revised substantially in 1998, to provide for some of the measures required by the Alpine Convention, especially pollution control, protection of the mountain landscape and sustainable development of the mountain areas. On the sustainable development aspect of the law, for example, article 1 provides for incentives for the development of mountains. Among other things, the law provides for subsidies from the government for development projects in the mountain communities to facilitate environmental protection, including establishment of refuse disposal facilities. The law also provides subsidies to support trades that would provide alternative livelihoods to the people and prevent over-utilization of the fragile mountain lands.
- *The Federal Mountain Region Housing Improvement Act 844 of 1970.* This law contains a number of provisions that relate to mountain protection. For example, article 4 requires any work undertaken for home improvement in mountain regions to be done in accordance with the requirements of physical planning, protection of nature and landscape, and environmental conservation. The provisions strengthen the purpose of the infrastructure loans under the Swiss Mountain Law to promote the sustainable development of mountain regions.

- *The Federal Agriculture Act and the 1998 Ordinance on Direct Payment to Agriculture.* In furtherance of the Alpine Protocol on Mountain Farming, these laws contain provisions for financial aid to mountain communities for sustainable promotion of agriculture in the mountain areas.

32. The various Swiss mountain laws are implemented by bodies responsible for enforcing and applying the various laws, such as the Swiss Agency for the Environment, Forests and Landscape. As a federal state, Switzerland's responsibility for natural resource management and protection of the environment is shared between different levels of government: the Confederation, the cantons and, to a small extent, municipal authorities.

III. Forest Ecosystems

1. Ecosystem Characteristics and Vulnerabilities

33. Forest ecosystems perform important ecological and economic functions. Internationally, there are several different definitions of a forest. Some definitions depend on the actual vegetation on the ground. For example, the European Union has defined forestland as having at least 20% canopy closure and a minimum area of 0.5 hectares. For Mediterranean regions, the 10% canopy cover is the adopted definition. Similarly, the United Nations Food and Agriculture Organization, which undertakes considerable work on forest protection, defines forests as land with 10% tree cover. Other definitions depend on legal designation of areas as forests, or legal classification of land use as forest, agricultural or urban.

34. Regardless of the definition, it is important to bear in mind that forests are more than simply "areas with trees." Trees are but one component of a forest ecosystem, which comprises various species of plants, animals, mammals, and other organisms that interact amongst themselves and with their physical environment.

35. Forests perform vital ecological services and provide ecological goods that provide many benefits to humans. Scientific research and direct observation in many areas of the world show that forests make water available because undisturbed forests tend to maintain high rates of infiltration that ensure ground water recharge. Therefore, removal of forests, especially in tropical areas, results in a reduction of dry season flows of rivers, notably those originating in forest catchment areas. Scientific studies and research also show that in certain circumstances, for example where forests cover extensive areas, like in the Amazon basin, forest increase precipitation and their removal may result in less rainfall. Removing forests also degrades water quality because forest vegetation can no longer reduce and eliminate water-borne pollutants that would be carried in surface run off, or immobilize or transform pollutants through chemical and biological processes.

36. Forests also prevent soil erosion, especially on steep slopes. This function is particularly important because many forests are found in mountainous areas that receive heavy rainfall that could easily cause soil erosion if not protected by vegetation. If the presence of forest vegetation helps prevent erosion, it follows that removal of forests promotes erosion, with attendant high run off, downstream sedimentation and siltation, degradation of water quality, and increased flooding, especially of low-lying areas.

37. The World Commission on Forests and Sustainable Development has articulated the importance of forest ecosystems as follows:

> The whole forest issue is about people, sometimes illustrated in a direct and brutal way. When some 10,000 people drowned in mud and water in Central America in November 1998 the blame was on Hurricane "Mitch," the worst of its kind in a long time. This was only half of the truth about the tragic event. The other half is about land mismanagement in the region. Big cash crop farms, often multinational, have gradually taken over the fertile plains and driven poor families to cultivate and collect firewood from marginal lands and forested mountain hillsides. As expected, these lands have become eroded, causing unprotected soil to wash away by forceful rains, forming mudslides which killed everything in their path.

38. Moreover, forests help to maintain climatic balances, and to avert or slow climate change by storing carbon in their living matter and soils and by absorbing atmospheric carbon dioxide. Conversely, forests are a source of destructive greenhouse gases when burned and destroyed. Burning and destruction of forests lead to emission of carbon and carbon dioxide into the atmosphere where the gases contribute significantly to global warming by trapping heat from incoming solar energy in the atmosphere. The relationship between forest cover and climate change is one of the global dimensions of forest ecosystem protection.

39. In addition, forests are home to millions of indigenous people in many countries in the world and are habitat to numerous diverse species of animals, plants and other organisms. Forests contain at least two thirds of the Earth's terrestrial species and 70% of the world's plant and animal species. The biotic diversity of forests serves as a foundation for selection and breeding of plants and animals. The genetic bank is also drawn upon to strengthen the yield and resistance of food crops and for materials of medicinal and industrial value. Forest dwellers are dependent on forests for their economic, social, cultural and spiritual well-being.

40. These vital functions of forests and the delicate ecological balance that forests maintain are being greatly upset and undermined by a variety of human activities. Increasing human populations have resulted in accelerated deforestation in many countries as forest lands are cultivated or cleared to grow food crops or raise cattle, or cut simply for fuel. For example, an estimated two billion people in developing countries still rely on wood as their source of fuel. The quest for development has also resulted in massive logging for timber for domestic consumption and export and turning forest lands into cash crop farms. There is also the problem of illegal logging in national and other publicly owned forests, which not only destroys forest ecosystems, but also distorts timber markets, acts as a disincentive to sustainable forest management, and robs forest owners and governments of massive revenues due to them from forestry activities.

41. Lack of, or negative, governmental forestry policies have had a share in the reduction of forest cover. In many countries, regular and uncontrolled forest clearing are authorized by governmental authorities, usually without any consideration of adverse impacts or consultation with affected communities.

42. Ironically, although it is usually assumed that the greatest value can be extracted from a forest by maximizing timber and pulp products or by converting it to agriculture, the ecological functions of forests that are generally regarded as free or simply not noticed are highly valuable. For example, when alternative management strategies for the mangrove forests of Bintui Bay in Indonesia were compared, taking into account the value of fish, locally used products, and erosion control, it was found that it would be most profitable to keep the forests to yield US $4800 per hectare, instead of cutting them down for timber, which would only yield US $3600 dollars per hectare.

2. International Environmental Regime relating to Forest Ecosystems

43. To date, there is no comprehensive legally binding international agreement dealing specifically with forests and the environmental, social, and economic aspects of the management and preservation of forest ecosystems.

44. Some critics of an all-encompassing forest convention approach point to the great diversity of the world's forests and the challenge of arriving at an agreement that would be a meaningful contribution to global forest protection.

45. However, the fragmented nature of forest-related provisions under existing international agreements is one of the key reasons proponents of a legally binding forest agreement argue for a comprehensive, ecosystem-oriented approach to the protection and sustainable development of forests.

a) The Ramsar Convention on Wetlands of International Importance, especially as Waterfowls Habitat

46. The Ramsar Convention on Wetlands of International Importance especially as Waterfowl Habitat ("1971 Ramsar Convention") was adopted on 2 February 1971, and entered into force on 21 December 1975. As of November 2005, the 1971 Ramsar Convention has 147 parties.

47. The 1971 Ramsar Convention applies to forest ecosystems to the extent that they fall within the Convention's definition of "wetland" under article 1. Article 2 of the Convention requires each party to designate suitable wetlands within its territory for inclusion in a "List of Wetlands of International Importance" which is maintained by a bureau established under article 8 of the Convention. Selection of wetlands of international importance is based on set criteria including their international significance in terms of ecology, botany, zoology, limnology or hydrology. For example, Brazil, which became a party to the Ramsar Convention on 24 September 1993, has included Varzea Forest in the Mamiraua area as a wetland of international importance under article 2 of the Convention.

48. Once designated as wetlands of international importance, forests are to be conserved in the manner stipulated by articles 3, 4, 5 and other provisions of the 1971 Ramsar Convention. Among other conservation actions, article 4 obligates parties to establish designated forests as nature reserves to be protected and preserved.

b) The Convention concerning the Protection of the World Cultural and Natural Heritage

49. The Convention concerning the Protection of the World Cultural and Natural Heritage ("1972 World Heritage Convention") was adopted in November 1972, entered into force on 17 December 1975, and has 180 parties as of November 2005).

50. The 1972 World Heritage Convention requires parties to protect natural and cultural heritage of "outstanding universal value." Under articles 1 and 2, natural and cultural heritage include natural sites and areas which are of outstanding universal value from the point of view of science, conservation and natural beauty, regardless of whether such areas have been delineated by a party as forest reserves, nature reserves, or some other conservation area. Article 3 requires each party to delineate such areas within their territories as "World Heritage Sites" to be included in a "World Heritage List". To date, the World Heritage List includes 812 properties, of which forty-eight are tropical forests covering more that 32.3 million hectares. Once an area is designated as a World Heritage Site, article 4 of the 1972 World Heritage Convention requires each party to protect, conserve, and transmit the forests to future generations. To meet these requirements, article 5(d), *inter alia*, of the agreement requires parties to take appropriate legal, scientific, technical, administrative, and financial measures.

c) The Convention on International Trade in Endangered Species of Wild Flora and Fauna

51. The Convention on International Trade in Endangered Species of Wild Flora and Fauna ("1973 CITES") was adopted in 1973, and protects a number of timber species and plants through regulation. 1973 CITES is discussed in more detail in Chapter 14 of this Manual.

d) The Rio Conference Instruments

52. At the 1992 Rio Conference, forest issues moved closer to the centre of international attention. Each of the three conventions discussed at Rio addresses important aspects of global forest conservation: (i) the 1992 United Nations Framework Convention on Climate Change and its Kyoto Protocol (the latter one adopted in 1997), (ii) the 1992 Convention on Biological Diversity, and (iii) the 1994 United Nations Convention to combat Desertification in Countries experiencing Serious Drought and/or Desertification, particularly in Africa, whose issues were raised in Rio but was concluded after the Rio Conference. These Conventions are addressed more fully in chapters 10, 15, and 19. The Forest Principles are covered in section f) below.

53. The first multi-party convention is the United Nations Framework Convention on Climate Change ("UNFCCC"), which entered into force in March 1994, and its Kyoto Protocol, which entered into force on 16 February 2005 and has as of November 2005, 189 parties. An overarching objective of UNFCCC is the reduction of greenhouse gas concentrations in the atmosphere. Within a specified time frame, the levels of greenhouse gases will be reduced so they do not dangerously interfere with the international climate system, while enabling economic development of nations to proceed in a sustainable manner.

54. To the extent that forests constitute sinks for greenhouse gas emission, their preservation and enhancement is touched upon by the global climate change regime in UNFCCC. Article 4.1(d) calls upon parties to promote sustainable management and cooperate in the conservation and enhancement of greenhouse gas sinks and reservoirs, including forests. This focus on forests as carbon sinks and reservoirs, as opposed to ecosystems, is pursued in the 1997 Kyoto Protocol to UNFCCC. The 1997 Kyoto Protocol sets out binding targets for reducing emission of greenhouse gases and a range of methods for meeting these targets. One of these methods, provided for by article 2.1(a) (ii) is the protection and conservation of forests. This option is further outlined in article 3 of the 1997 Kyoto Protocol, which enshrines parties' emission reduction and limitation commitments. Article 3.3 highlights that parties performances will be measured against the net changes in greenhouse gas emissions, be they from actual changes in emissions or changes in absorption by "carbon sinks" resulting, *inter alia*, from afforestation, reforestation or deforestation. Under the 1997 Kyoto Protocol, measures such as afforestation and reforestation, which increase living plant matter that absorb carbon dioxide and other green house gases, can be used by developed countries to offset their green house gas emissions. On the other hand, changes in land use activities such as deforestation that deplete carbon sinks will be subtracted from the amount of permitted emissions. However, methodologies for achieving and measuring changes in a country's carbon sinks continue to be a sensitive topic.

55. In contrast to UNFCCC, the second multi-party convention, the Convention on Biological

Diversity focuses on a significant aspect of ecosystem protection: the conservation of biological diversity. The Biodiversity Convention has three goals: (i) conservation of biological diversity, (ii) sustainable use of components of biological diversity, and (iii) the fair and equitable sharing of benefits arising from the use of genetic resources. For example, article 8 of the Biodiversity Convention requires parties to take appropriate measures for *in situ* conservation of biological diversity, which applies to natural settings of forest ecosystems. Since its adoption, the scope of the Biodiversity Convention has expanded to specifically include forest ecosystems.

56. In 1995, the COP to the Biodiversity Convention adopted a statement in which they stressed that forests have a crucial role to play in maintaining global biological diversity. This led to the development of a work programme for forest biological diversity in 1996, which focuses on the development of technologies and research necessary for the conservation and sustainable use of all types of forests. Further, in 1998, the COP decided to consider forest protection and conservation as one of the priority themes for its future activities. It established a technical expert group on forest biological diversity with mandate to review available information on status, trends, and threats to forest biological diversity and to suggest action to address them. The group has the potential to become an important forum for developing more specific forest conservation and protection rules under the Biodiversity Convention.

57. In addition, a Subsidiary Body on Scientific, Technical, and Technological Advice supports the work of the COP to the Biodiversity Convention. This panel works on a variety of issues concerning conservation of biological diversity, including impacts of forest fires on forests and harvesting of non-timber forest resources. The Global Environment Facility also strengthens measures taken under the Biodiversity Convention by providing funding for the agreement's forest biological diversity conservation projects. In 2002, the COP adopted Decision VI/22 that set out a programme of work for forest biological diversity.

58. The third convention adopted in the aftermath of Rio, the United Nations Convention to combat Desertification in those Countries experiencing Serious Drought and/or Desertification, particularly in Africa ("Desertification Convention"), also addresses forest issues. In pursuit of its objectives to combat desertification, to mitigate effects of drought, and to contribute to sustainable development, the regime must consider deforestation, as it is one of the significant factors contributing to desertification. Specifically, article 10 of the Desertification Convention requires parties to prepare and implement national action programmes identifying factors contributing to desertification and indicating practical measures that they intend to take to combat desertification and mitigate the effects of drought. Many of the national action programmes that have been prepared and adopted include measures to prevent and mitigate the effects of deforestation.

e) The International Tropical Timber Agreement

59. The International Tropical Timber Agreement ("1994 ITTA") was originally adopted in 1983, renegotiated in 1994 and entered into force on January 1, 1997. As of November 2005, it has 60 parties, including countries that produce and those that consume timber.

60. In the International Timber Agreement, parties recognize the need for effective conservation and development of tropical timber forests with a view to ensuring their optimum utilization while maintaining the ecological balance of the regions concerned and of the biosphere. 1994 ITTA provides an effective framework, which enables:

- Cooperation and consultation between tropical timber producing and consuming members with regard to all relevant aspects of the tropical timber economy;
- Promotion of research and development with a view to improving forest management and wood utilization; and
- Encouragement of members to support and develop industrial tropical timber reforestation and forest management activities.

61. To meet those objectives, articles 1 and 3 of 1994 ITTA establish an International Timber Organization to adopt necessary rules and regulations, to utilize the services and expertise of existing intergovernmental, governmental, or non-governmental organizations, and to exercise such powers and perform such functions as necessary. The ITTA is currently being renegotiated.

62. Since its creation, the International Timber Organization has developed sustainable forest management indicators for parties to the Agreement, served as a forum for consultation on tropical forest matters; undertaken a number of forest conservation activities, and assisted members

to meet their year-2000 objective. The objective was that, by 2000, all tropical timber products traded internationally by member states would originate from sustainably managed forests.

f) The Rio Forest Principles

63. Because forest issues proved to be so sensitive that negotiations at the Rio Conference fell short of a legally-binding instrument on forests, negotiators instead reached consensus on a number of forest issues that they committed themselves to address and on actions that they would take to conserve and sustainably manage forests. These were set out as the Non-Legally Binding Authoritative Statement of Principles for a Global Consensus on the Management, Conservation and Sustainable Development of all types of Forests ("1992 Rio Forest Principles"). The 1992 Rio Forest Principles reflect the negotiators' efforts to balance a wide range of competing concerns. Much of the balancing fell within the broad theme of "environment development" tensions, along with the accommodation of the needs and aspirations of forest-dwelling populations.

64. The 1992 Rio Forest Principles affirmed states' sovereignty to exploit their own natural resources pursuant to their own environmental policies. The principles also capture states' responsibilities to ensure that activities within their jurisdiction or control do not cause damage to the environment of other states or areas beyond their national jurisdictions. With respect to forests, this means, for example, that governments must ensure that deforestation does not cause erosion or flooding in other states. However, as environmental concerns regarding the decline of forest ecosystems often are cumulative or global in nature, it will tend to be difficult to attribute adverse effects to individual states. For that reason, the 1992 Rio Forest Principles place certain, limited constraints on parties' forest management and exploitation activities.

65. Further, the 1992 Rio Forest Principles call upon states to sustainably manage their forests, forest resources and forest lands to meet the needs of people that are directly dependent on timber and non-timber products, as well as forest ecosystem needs. Governments committed to provide citizens with accurate and reliable information about forests and forest ecosystems and to promote participation by local communities, non-governmental organizations, forest dwellers, industries, and other interested persons in decision-making on matters concerning forests and on efforts to conserve, preserve and sustainably manage forests. For example, before governments make decisions to construct roads and dams through forests or to convert forest lands to farmlands and settlement areas, they shall hold public hearings and dialogue with and collect views from all interested parties. In addition, states committed to take specific steps and actions to maintain the ecological balances of forests. Among other actions, they agreed to undertake afforestation and reforestation and create national regimes to ensure sustainable management, development and conservation of forests.

66. Chapter 11 of Agenda 21 flanks the Rio Forest Principles by providing a comprehensive action plan for regional and global efforts to find a sustainable balance between the ecological and economic functions of forests. The Commission on Sustainable Development ("CSD") was established to facilitate the implementation of these commitments made at the Rio Conference. The CSD then established the Open-Ended Ad Hoc Intergovernmental Panel on Forests ("IPF"), which is comprised of CSD member-government representatives.

67. In June 1997, the IPF submitted its final report to the CSD, which adopted it, and forwarded a set of recommendations to the UN General Assembly Special Session ("UNGASS" or "Rio Plus Five"). The UNGASS decided to continue the intergovernmental policy dialogue on forest issues through the establishment of an ad hoc open-ended Intergovernmental Forum on Forests ("IFF"), which operates under the aegis of the CSD. In 2000, the IFF was replaced by the United Nations Forum on Forests ("UNFF"), whose work programme encompasses a broad range of issues relating to sustainable development and conservation of forests, including ongoing exploration of suitable international arrangements and mechanisms. Thus, though the question of a legally binding forest agreement remains alive, it has not come any closer to a resolution. In the five sessions the UNFF has held (most recently June 2005), it was not possible for states to achieve agreement if negotiations on a legally-binding instrument on forests should start.

68. Leaving aside the issue of a legally binding forest agreement, it is important to note that the Rio Conference did serve to catalyze international, regional, and national action for sustainable management of forests and set the stage for continued work on appropriate solutions to threats to forests. It at once led to a global acceptance of the pivotal role that sustainable management of forests plays and underscored that the concept of

sustainable development of forests lacked clear definition. As a result, a number of international processes and other actions have been initiated in which countries and other interested parties have defined criteria and corresponding indicators to evaluate, monitor, and certify the sustainability of forest management activities. Of these international processes, the Montreal Process and the Pan-European Process on Protection of Forests provide good examples.

69. In September 1993, the Conference on Security and Cooperation in Europe sponsored an international seminar in Montreal on sustainable development of forests ("Montreal Process"). During the Montreal Process, the attending governments, including Australia, Canada, Chile, Japan and Mexico, developed seven international criteria and indicators for the sustainable management of forests. These criteria are essential components of the conservation and sustainable management of forests in temperate regions and include, *inter alia,* conservation of biological diversity, maintenance of forest contribution to the global carbon cycle, and maintenance of the health of forest ecosystems, and vitality and maintenance of productive capacity of forest ecosystems.

70. The Montreal Process requires that any party's management of its forest resources must include efforts to conserve the biological diversity of the forest ecosystem. The Montreal Process established a list of sixty-seven "indicators," including the extent to which a party's national legal framework supports the conservation and sustainable management of forests. Public participation in policy- and decision-making is an important "indicator."

71. In 1995, the Montreal Process was followed the Santiago Declaration, a statement of political commitment to sustainable forestry. Through the Santiago Declaration, parties agreed to be guided by internationally developed criteria and indicators in their national efforts to sustainably manage forests. Since endorsing the Santiago Declaration, countries participating in the Montreal Process have taken steps to apply the agreed criteria and indicators. A Working Group was created to clarify any issues that might arise in the process of implementation and to facilitate national efforts. One of the group's activities is to undertake an initial survey to determine availability of data for indicators in each country and the capacity of countries to report on indicators. Interim survey results suggest that most countries have data for and can report on 50% or more of the sixty-seven indicators of the Montreal Process.

72. The Montreal Process also developed a set of Pan-European Criteria and Indicators for Sustainable Forest Management ("Pan-European Process"), which is a European policy framework for sustainable forestry for use at the national level. The Pan-European Process has significantly enhanced European countries' management of their forests. The Pan European Process consists of six criteria, twenty-seven quantitative indicators, and 101 descriptive indicators. Components of the criteria requiring care include general conditions of forest biodiversity, rare and vulnerable ecosystems, and threatened forest species. For example, Criterion 4 requires the maintenance, conservation, and appropriate enhancement of biological diversity in forest ecosystems. The Pan-European Process also allows for forest certification, through which on-the-ground forestry operations by governments and other forest owners can be assessed against the predetermined set of standards.

73. These examples of non-legally binding instruments on sustainable forestry demonstrate that there is a growing international web of activities on forest conservation and management. These are to be welcomed as they help build consensus on how to address the international aspects of forest issues. These instruments represent efforts to slow deforestation, to provide for sustainable forest management, to preserve remaining forests, to increase forest cover, to specify tenure and land use rights and liabilities, and to allow active involvement of people at local and national levels in decision-making processes. However, they also illustrate the need for some oversight, to avoid overlapping and/or contradictory initiatives.

3. National Initiatives relating to Forest Ecosystems

74. This discussion highlights efforts by the United States and Japan to implement international regimes because, given the non-binding nature an international forest instrument to date, it is hard to track domestic "implementing" efforts.

a) United States

75. The United States has endorsed Agenda 21 and, in doing so, committed itself also to implementing the 1992 Rio Forest Principles. The United States was expected to create, maintain and enforce national laws that captured principles of sustainable forestry, including laws that:

- Incorporate principles and methods for ensuring sustainable forestry management;
- Enhance protection and sustainable