Fire Management today

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International Fire Management—Part 1

United States Department of Agriculture
Forest Service

Coming Next...

The next issue of *Fire Management Today* (68[4] Fall 2008), Part II of International Fire Management, gives insight into the International Cooperation in Wildland Fire Management and how countries around the world are meeting these challenges. Learn about the use of the Incident Command System as a basis for International Cooperation. {Excerpt} "Globally, communities expect that emergencies will be dealt with safely, effectively, and efficiently by emergency management agencies." Murray Dudfield, National Rural Fire Officer for the National Rural Fire Authority, Wellington, New Zealand. The Fall issue will highlight programs throughout the world that are working to meet these expectations.

Special Thanks to Our Coordinator

Recently retired from the Forest Service, Denny Truesdale was the fire management specialist for the Deputy Chief of State and Private Forestry in Washington, DC. He began serving as the International Activities Coordinator in 1990. He was a member of the Wildland Fire Advisory Group, United Nations International Strategy for Disaster Reduction, and the Wildland Fire Working Group of the North American Forestry Commission. He also served on the Advisory Group for the United Nations Food and Agriculture Organization's Fire Management Alliance. Denny has assisted in planning four International Wildland Fire Conferences and was the Chair of the International Liaison Committee, which is planning the 5th conference to be held in 2011.

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Fire Management today

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On the Cover:

On the Cover: *Prescribed burns are used around the world to remove dead leaves, grasses, and other forest litter so that any uncontrolled fire will burn with less intensity and can be controlled more safely with fewer resources. Pictured: Nepal, South Africa, and the Australia.*

The USDA Forest Service's Fire and Aviation Management Staff has adopted a logo reflecting three central principles of wildland fire management:

- *Innovation:* We will respect and value thinking minds, voices, and thoughts of those that challenge the status quo while focusing on the greater good.
- *Execution:* We will do what we say we will do. Achieving program objectives, improving diversity, and accomplishing targets are essential to our credibility.
- *Discipline:* What we do, we will do well. Fiscal, managerial, and operational discipline are at the core of our ability to fulfill our mission.

Firefighter and public safety is our first priority.

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by Tom Harbour
Director, Fire and Aviation Management
USDA Forest Service

International Fire Assistance
Benefits Are Many; Balance Is the Key

When a catastrophic event strikes the United States—whether it is a wildland fire, an all-hazard event such as the September 11, 2001, terrorist attacks, the Space Shuttle Columbia recovery, or Hurricane Katrina—we are there. When that call goes out, Forest Service employees with specialized skills immediately move into action. And, when we deploy our employees to such incidents, those Forest Service employees left behind are expected to respond also, by filling the voids and maintaining our daily business.

Making a Difference at Home and Beyond

We all play a part in responding to incidents, and we should feel good about the positive effect we make and be proud of the work we do—not only during times of emergency, but each and every day, as we manage and protect our national forests and grasslands.

We make a difference, and we are recognized and highly regarded not only here in the United States, but also on an international level.

Today is an age filled with challenge, and no matter which Federal agency we talk to, we are all facing the same problems—do more with less and be more efficient and effective in accomplishing our work.

Tom Harbour is the director of Fire and Aviation Management, Forest Service.

> The International Fire Program not only provides additional firefighting resources, but it enables us to exchange ideas with each other first hand—on-the-job training.

It is quite evident that, to actually overcome those obstacles, we must employ collaboration. We need to work hand-in-hand with Federal, State, and local partners by seeking out both the traditional and non-traditional opportunities to expand partnerships and collaborations to get our work done, whether it be our daily jobs of managing the public's land or in times of responding to emergency incidents.

Since our response to the September 11 terrorist attacks and the 2003 Space Shuttle Columbia Shuttle recovery, Forest Service employees have evolved from being firefighters to becoming all-hazard responders. By applying the Incident Command System (ICS) to other types of emergencies and events, we have undertaken a mentorship role by teaching ICS to other Federal and State agencies. We have worked alongside the New York City Fire Department, National Aeronautics and Space Administration, and Environmental Protection Agency and with other agencies teaching ICS's universal value and how it can be applied in their respective agency.

Strategic national alliance through emergency firefighting arrangements allowed Forest Service fire managers to assist fire managers from Australia during the 2007 fire season.

International Alliances—Our Friends Abroad

For years, we have had firefighters participating in exchange programs with Argentina, Chile, Mexico, Russia, South Africa, and Spain. We have unilaterally agreed with Australia, Canada, Mexico, and New Zealand to provide expertise and support during time of need. During the 2007 fire season, both Canada and Australia came to our aid.

The Forest Service has provided international fire assistance for decades. Fire managers at all levels have traveled across boundaries and around the world to educate and mentor international fire managers.

We have shared our toolbox with others so they can accomplish prefire mitigation work, better manage wildland fires, and respond to all-hazard emergencies.

What is in it for us? We also learn a different perspective. We bring that knowledge home with us and share it with our fellow firefighters. We also gain a broad melting pot of qualified firefighters and managers to call upon when our resources are tapped out.

We Share the Same Challenges

Through the international fire program, we have found that our issues and challenges are not ours alone, but that they cross oceans and continental boundaries. The international fire program affords a unique opportunity to comparatively view our firefighting problems with similar issues that other countries face.

The international firefighting experience has proven to be "an experience of a lifetime." The Forest Service has contributed to that experience by fostering those special relationships and participating with nontraditional partners.

I believe our evolution to the fire doctrine lights the way to the future, both here at home and through our international experiences. Doctrine demands that we think—and that we use our minds. At times, we need to think outside the box. Although our primary job—and the expectation of the American people—is that we do our best to safely manage and protect our natural resources here at home, we do that through collaboration with other Federal, State, and private landowners. What the public may not recognize or know about is a shared obligation with our international partners.

I personally know the rewards of an international fire assignment. It is an honor to be part of that experience, and it is our responsibility to continue to reach out when and where we can. The key, however, is balance.

We must weigh our ability to safely protect and manage our Nation's forests and grasslands and to serve the people who visit our national forests; then, we must balance it with our ability to respond to fires, earthquakes, and storms across the United States and our desire to reach out to other countries. It is a big job but, each year, I am overwhelmed with how much we do accomplish. ■

2007 International Fire Assistance

- The United States cosponsored the 4th International Wildland Fire Conference in Seville, Spain.
- We supported exchange experiences and technological advances study by hosting 10 participants from Australia and New Zealand.
- We provided fire assistance to Canada and reciprocal fire assistance to Australia.
- We provided assistance and expertise to Greece during its fire season.

Our Allies

- 2000–Canada, Australia, and New Zealand assisted the United States.
- 2003–Firefighters from Australia and New Zealand assisted the United States.
- 2004–16 U.S. smokejumpers and 5 type 1 crews provided fire support to Canada.
- 2005–2 type 2 U.S. fire crews were sent to Canada to provide fire support, with Canada providing reciprocal help during the U.S. fire season.
- 2006–1 type 1 incident management team, 3 type 1 fire crews, 2 type 2 initial attack crews, and miscellaneous overhead assisted in Canada.
- 2006–Canada provided fire crews, smokejumpers, and overhead to the United States; Australia and New Zealand provided fire specialists and management personnel.

We make a difference, and we are recognized and highly regarded not only here in the United States, but also on an international level.

Forest Service employees provide fire training opportunities abroad.

The United Nations International Strategy for Disaster Reduction Global Wildland Fire Network

Johann Goldammer

One priority that the Working Group on Wildland Fire addressed was the establishment of the Global Wildland Fire Network (GWFN). The concept of GWFN was to identify or establish Regional Wildland Fire Networks, preferably based on existing formal or informal network structures and initiatives. The envisaged timeframe for setting up the network was January 2002 through July 2003. The 3rd International Wildland Fire Conference and the International Wildland Fire Summit were used as platforms to convene representatives from regional networks.

Professor Dr. Dr.h.c. Johann Georg Goldammer is head of the Fire Ecology and Biomass Burning Research Group, Max Planck Institute for Chemistry, and Director of the Global Fire Monitoring Center (GFMC), Germany. The GFMC is a contribution of Germany to the United Nations International Strategy for Disaster Reduction (UNISDR). At Freiburg University, he is serving as professor for fire ecology. Since 2005, the GFMC has been an Associate Institute of the United Nations University. J.G. Goldammer is also serving as coordinator the UNISDR Wildland Fire Advisory Group and the UNISDR Global Wildland Fire Network. As one of the core tasks of his lead of the United Nations Economic Council of Europe-Food and Agriculture Organization (UNECE-FAO) Team of Specialists on Forest Fire, he has been the editor of UNECE-FAO International Forest Fire News since 1988. He works closely with the a number of specialized UN agencies and programs, such as FAO and Joint UNEP-Office for the Coordination of Humanitarian Affairs Environment Unit, Emergency Services Branch, and the Advisory Group on Environmental Emergencies. In 2001, the GFMC was awarded the UN Sasakawa Award for Disaster Reduction.

The "Strategy for Future Development of International Cooperation in Wildland Fire Management" included the following recommendations:

> *"The Regional Wildland Fire Networks will be consolidated, developed and promoted through active networking in information sharing, capacity building, preparation of bilateral and multilateral agreements, etc. This process will be facilitated through regional Wildland Fire Conferences and Summits."*

At the International Wildland Fire Summit, a meeting was held with the regional fire management groups mandated under the auspices of the United Nations (UN)—UN International Strategy for Disaster Reduction (UN-ISDR) Working Group on Wildland Fire, Economic Commission for Europe (ECE)/Food and Agriculture Organization (FAO)/International Labour Organization (ILO) Team of Specialists on Forest Fire, Fire Management Working Group, FAO North American Forestry Commission [NAFC], and the Forest Fire Group of FAO *Silva Mediterranea*). . A key output of the joint meeting—the first joint meeting of the four UN groups—was the recommendation to maintain a body under the auspices of the UN to enable the international community to maintain a unifying platform for the UN and jointly with non-UN groups and agreements.

To support the work of the GWFN, the UN-ISDR Interagency Task Force for Disaster Reduction (IATF) accepted the proposal to create a Wildland Fire Advisory Group (WFAG) under the auspices of the UN-ISDR. The WFAG represents an advisory body to the UN system aimed at providing technical, scientific, and policy-supporting advice to the UN family through the UN-ISDR and the IATF and acting as a liaison between the UN system, the GWFN, and its supporting partners.

The 4th International Wildland Fire Conference held in Sevilla, Spain, May 13–17, 2007, provided a major step forward in organizing the GWFN. The conference was attended by 1,531 participants from 88 countries. Building on the outputs of the previous International Wildland Fire Conferences (Boston, 1989; Vancouver, 1997; Sydney, 2003),

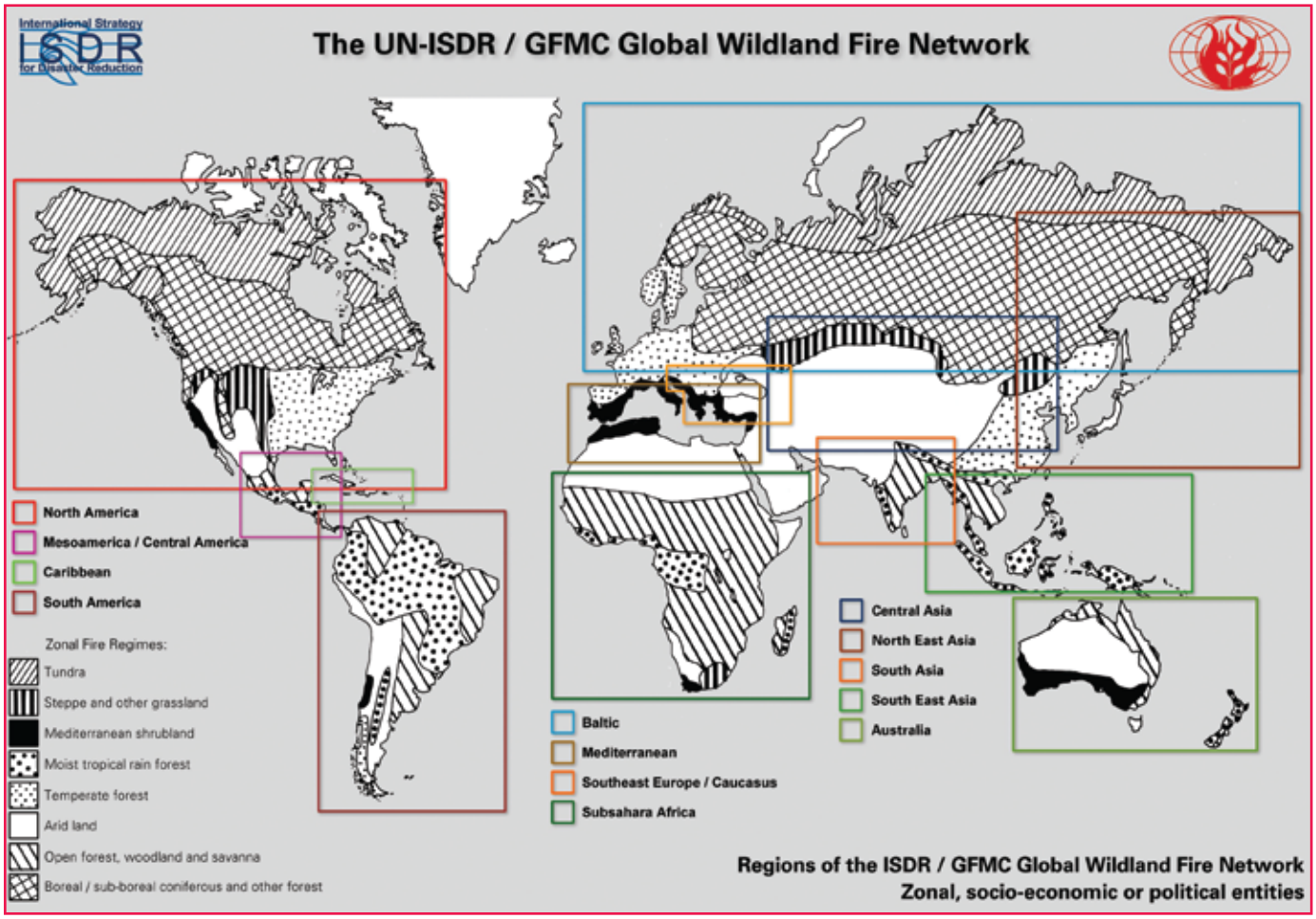
You may view the 13 GWFN regional reports and posters presented at the 4th International Wildland Fire Conference (2007) on the Web: http://www.fire.uni-freiburg.de/sevilla-2007/regional-sessions.html and http://www.fire.uni-freiburg.de/GlobalNetworks/posters.html

one major objective of the 4th Conference, which was held under the auspices of UN-ISDR, FAO, and the European Commission, was to provide a platform for a meeting of all Regional Wildland Fire Networks. All 13 regional networks (figure 1) contributed to the conference. In six joint regional sessions, the Regional Wildland Fire Networks and representatives of the European Commission, as well as other participants, discussed a self-assessment of the fire situation in the regions and formulated recommendations for future action in the regions, as well as globally. [1]

Established in 1998, the Global Fire Monitoring Center (GFMC) is a subdivision of the Biogeochemistry Department of the Max Planck Institute for Chemistry and United Nation University (UNU) Associate Institute, located at Freiburg University, Germany. As a global facility for vegetation fire monitoring, documentation, and analysis, GFMC is providing scientific and technical advice to governments, regional entities, and international organizations, notably the UN, for the development of policies and strategies to reduce the negative impacts of fire on the environment and humanity. GFMC is serving as Secretariat of the UNISDR Wildland Fire Advisory Group and the Global Wildland Fire Network.

Johann Goldammer can be reached at johann.goldammer@fire.uni-freiburg.de ■

1 The postconference Web site includes all regional session reports and the global conference report: http://www.fire.uni-freiburg.de/sevilla-2007.html.



The Regional Wildland Fire Networks

In the following pages, the coordinators of the 13 Regional Wildland Fire Networks summarize network activities. Readers interested in more detailed information on the status of international cooperation in wildland fire management are encouraged to visit the Web site of the Global Fire Monitoring Center (http://www.fire.uni-freiburg.de/) and, in particular, the dedicated Web pages of the Global Wildland Fire Network (http://www.fire.uni-freiburg.de/GlobalNetworks/globalNet.html).

North American Forest Commission—Fire Management Working Group

Bill DeGroot, Roberto Martinez Dominguez, and Dale Dague

The North American Network—which covers Canada, Mexico, and the United States—is coordinated by the North American Forest Commission's Fire Management Working Group (FMWG).

In 1960, the United Nations Food and Agriculture Organization established the North American Forest Commission (NAFC) with Canada, Mexico, and the United States as members. The purpose of the commission is to advise on regional forest policies and to review and coordinate its implementation, to exchange information, and to recommend appropriate solutions to technical problems.

Bill DeGroot is a scientist with the Canadian Forest Service in Toronto, Canada. Roberto Martinez Dominguez is the director for Fire Management for the Mexican Forest Commission, Guadalajara, Mexico. Dale Dague is an emergency management specialist with the Forest Service in Washington, DC.

The Fire Management Working Group (FMWG) was established in 1962 as part of the NAFC. Annual meetings have rotated continually among the member countries since its inception. The following brief summary highlights some of the FMWG's activities under the three primary objectives of the group:

> The FMWG's goal is to promote increased international participation by hosting the conference on all continents.

1. **To exchange experiences and technological advances regarding prevention, wildland fire management, and fire use.**

   All three member countries have held formal firefighting training and have instituted fire management programs for the past several years.

   FMWG strongly supports participating in information exchange sessions such as conferences, workshops, and meetings covering a wide range of fire management topics (such as implementing the Incident Command System).

   In 2005 and 2006, the FMWG sponsored two participatory panels in which representatives of community-based fire man-

The 2002 Kamloops Fire, Canada.

agement initiatives in Canada, Mexico, and the United States shared experiences, strategies, challenges, and commonalities. The panel provided recommendations to strengthen local capacity and community-based fire management, including improving funding horizons, involving community planners, and utilizing scientific study.

Primary Objectives

- To exchange experiences and technological advances regarding prevention, wildland fire management, and fire use.
- To provide mutual aid and technical exchanges among Canada, Mexico, and the United States in the development of strategy and appropriate actions to resolve North American fire problems.
- To actively support and participate in international fire management programs with fire management agencies throughout the world by developing and promoting activities that support international cooperation and development.

2. **To provide mutual aid and technical exchanges among Canada, Mexico, and the United States in the development of strategy and appropriate actions to resolve North American fire problems.**

   The NAFC-FMWG supported establishing long-standing agreements that form the basis of fire management aid across North American borders during critical times: The Mexico-United States Mutual Assistance Agreement was originally signed in May 1968, and the Canada-United States Mutual Assistance Agreement was signed in May 1982.

   In other examples, the U.S. Agency for International Development provided funding to reinforce and improve the Mexico Fire Management Program following the devastating 1998 fires in Mexico. The Forest Service International Programs provides its support to this program by (1) providing a training and capacity building program, (2) strengthening local participation, and (3) conducting fire management research and technology. Canada and Mexico are also working together to develop the Mexico Forest Fire Information System, including technical design, fuel type analysis, and scientific calibration components.

3. **To actively support and participate in international fire management programs with fire management agencies throughout the world by developing and promoting activities that support international cooperation and development.**

   FMWG has sponsored many international study tours, the first being traveling across Canada and the United States in 1968 and across Mexico and the United States in 1975. More than 60 representatives from 27 countries participated. FMWG continues to support regular study tours between North America and countries in other global regions.

   The FMWG has actively supported information exchange among the global fire community by sponsoring the International Wildland Fire Conferences (IWFC) series previously held in Boston, MA (United States), in 1989; Vancouver, Canada, in 1996; Sydney, Australia, in 2003; and Sevilla, Spain, in 2007. FMWG also supports the current planning activities for the 5th IWFC to be held in 2011 in South Africa.

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Central America Wildland Fires

Luis Diego Román Madriz

The Central American Regional Network is made up of the countries from Guatemala to Panama. Mexico participates in this network and the region is also part of the Latin American and Caribbean Forestry Commission.

The Central America region possesses an incredible 12 percent of the biological richness of the world—in barely 2 percent of the land area of the planet.

Natural ecosystems that cover 22 different ecoregions, including corral reefs, low tropical humid forests, pine savannas, semi-arid ligneous lands, meadows, and mountainous forests, make up this unusual region. In this region, biodiversity is affected by fires of different intensity and extent of damage—some ecosystems are fire dependent, while others are fire sensitive.

Nationally based statistics show that during the period of 1998 through 2006 (table 1), an average 657,700 acres (266,116 ha) in Central America was affected by fire. During those 9 years, the largest area burned was recorded in 1998, affecting 2,672,750 acres (1,081,622 ha). In contrast, low fire activity was recorded during 2004 and 2006, with approximately 247,100 acres (100,000 ha) affected.

Luis Diego Román Madriz is the coordinator for the SINAC-MINAE Fire Management Program and the National Commission on Forest Fires (CONIFOR) in Costa Rica.

The Central American fire situation is usually most severe during droughts caused by climate variability—notably the El Niño phenomenon.

These figures include Central American countries but do not include Mexico.

During the past 5 years, the Central American region has lost an estimated $500 million (U.S. dollars) per year due to direct and indirect effects of wildland fires.

Human Activities and Fire

The main causes of wildland fires are escaped pasture burns, traditional application of agricultural land-clearing fires, slash-and-burn agriculture, or accidental fires. The fire situation is usually most severe during droughts caused by climate variability—notably the El Niño phenomenon.

Other fires are set to clear land for development—some of which may not actually belong to a developer—but are set just the same. This type of activity is oftentimes a result of social inequity, lack of land titles, lack of a forest culture, and a misunderstanding or disagreement with government.

Strengthening Participation

In the past few years, fire managers have made many advances by consolidating and developing national fire management programs in Central American countries; however, a greater political commitment and sufficient financing are needed to continually improve and implement the fire management programs in this region.

National and private institutions and civil society must be willing to work together, with an equally strong commitment to protect the region's forests, and, with that commitment, implement fire management programs throughout.

In the past 12 years, fire organizations have developed a number of activities in Central American countries resulting in a slow and steady turn toward joint fire management programs. The Central American Working Group on Fire Management and other organizations are working together to create a mandatory consolidation under the Technical Committee on Forests (CTB) of the Central American Commission of Environment and Development (CCAD).

Strategically Building a Foundation

In October 2005, the Global Fire Monitoring Center, the CCAD, and the Central American Working Group on Fire Management, with the assistance and support of a United Nations Food and

Table 1. *Area affected by forest fires in Central America during the period 1998–2006.*

Country	Area (ha) per year									Total area (ha)	Mean area (ha/year)
	1998	1999	2000	2001	2002	2003	2004	2005	2006		
Costa Rica *	64.893	11.192	36.896	57.511	50.337	32.372	35.228	14.822	15.192	318.443	35.383
El Salvador	2.041	359	1.700	1.613	1.261	3.661	3.497	3.000	2.308	19.440	2.160
Guatemala	678.795	10.623	53.404	18.768	17.938	60.119	6.703	34.154	12.411	892.915	99.213
Honduras	96.623	54.986	63.360	57.987	80.844	56.659	12.784	154.225	60.022	637.490	70.832
Nicaragua	161.684	25.227	92.355	24.318	26.148	27.448	33.252	3.840	1.887	396.159	44.018
Panama	77.586	3.397	2.204	4.247	3.739	17.765	8.016	6.000	7.638	130.592	14.510
Total	1.081.622	105.784	249.919	164.444	180.267	198.024	99.480	216.041	99.458	2.395.039	266.116

Source: Own elaboration, based on the Central American Commission of Environment and Development. 2007. Manual Centroamericano de Prevención de Incendios Forestales. 46 p.
* The registries of affected area in Costa Rica include forests in different succession stages, plantations, other natural ecosystems, and other affected areas.

In the past 12 years, fire organizations have developed a number of activities in Central American countries, resulting in a slow and steady turn toward joint fire management programs.

Agriculture Organization technical cooperation project, introduced the 2005–2015 Central American Fire Management Strategy to the Ministers of Environment for their approval. The strategy is multifaceted, providing a structure for addressing various levels of government and politics, fire management cooperation, and consolidated education outreach, including the following:

- A regional political-technical framework of national and regional guidance for implementing integrated fire programs through mutual agreement.
- The means to strengthen the Regional Central America Wildland Fire Network, creating new and exciting opportunities to develop relationships between other regions with common attributes.
- A solid base for establishing partnerships with international groups, such as the Global Wildland Fire Network, and expanding its efforts to include other international cooperation.
- A plan for developing and consolidating fire management programs and educational campaigns to effectively and efficiently address the needs of various social groups of the region.

Not long after the strategy was announced, the Central American Working Group on Fire Management distributed a Central American Manual on Forest Fire Prevention to the countries in the regional network. The distribution of the Manual was approved by the Council of Ministers of Environment of the CCAD during their XLI ordinary meeting in January 2007 in Belize.

The manual is an easy-to-apply technical support tool with application in training and program development. The manual includes measures, actions, norms, or actions necessary to reduce the occurrence of forest fires and mitigate the impacts. Participants of the Central American Forum on Forest Fire (San Salvador, El Salvador, October 30–31, 2007) underscored the need for implementing the regional strategy and using the manual to address regional needs.

The members of the Central American network have initiated key actions to reduce the impacts of fire on this highly diverse and ecologically important area. Focusing on the human-caused fires as a primary concern is expected to have an impact over the next few years. The fire prevention manual provides a consistent set of standards for all agencies to follow and will promote interagency cooperation. ■

New Approaches in Wildland Fire Management in the Baltic Region

Johann Goldammer

The Baltic Regional Wildland Fire Network includes all countries bordering the Baltic Sea, the United Kingdom, the Netherlands, and adjoining eastern European countries such as Ukraine and Belarus.

In most countries of the Baltic Region, the use of fire and other disturbances has contributed to shape landscape patterns of high ecological and cultural diversity and value; e.g., heathlands, open grasslands, meadows, and swidden (shifting) agriculture sites, as well as open and stress-resilient forest ecosystems. The rapid socioeconomic changes in the past four decades and the recently increasing trend of exodus from the rural areas to cities all over the region have resulted in abandonment of traditional land-use methods. With the elimination of these disturbances by cultivation, including traditional burning practices, large areas of Europe are converting to fallow lands, a process that is associated with ecological succession toward brush cover and forest and an overall loss of open habitats.

Baltic temporate boreal zone.

Besides the loss of valuable biodiversity, the abandoned lands constitute an increase in wildfire hazard—a trend that is illustrated by a growing number of extremely severe fire episodes. Similarly, the exclusion of fire in natural ecosystems such as northern boreal and sub boreal coniferous forests in Eurasia has resulted in changing vegetation composition and an increase of wildfire hazard, notably in central-eastern Eurasia. Changing paradigms in ecology and nature conservation recently have led to reconsideration of fire-exclusion policies in certain sectors of land and resource management, nature conservation, and forestry.

The Eurasian Fire in Nature Conservation Network (EFNCN), founded in 2000, is addressing the introduction or restoration of fire as a tool in wildfire hazard reduction and nature conservation and is a core activity of the team in the region. EFNCN, which is facilitated by Global Fire Monitoring Center (GFMC), convened a dedicated Eurasian symposium in January 2008 in close association with the European Union (EU) FIRE PARADOX project; the EU LIFE Project, "Rohrhardsberg, Obere Elz und Wilde Gutach"; and the EU Leonardo da Vinci "EuroFire" Programme. The first European PhD course, Hot Topics and Burning Issues: Fire As a Driver of System Processes—Past, Present, and Future (March/April 2008), is being held at the C.T. de Wit Graduate School for Production Ecology and Resource Conservation, Wageningen University, in cooperation with the GFMC and the United Nations (UN) University.

At the operational level of fire management, a gap in the training provision for firefighting personnel, the rural and land-based sector, sectoral organizations, and education and training institutions in Europe was identified in 2005. A partnership of GFMC, the International Technical Fire Committee, and Rural Development Initiative was created in 2005 to address the issue. In 2006 the partnership successfully bid for funding to produce a "European Wildland Fire Management Handbook" sponsored by the EU Leonardo Programme. The handbook will provide an online basic wildfire, competency-based, education and training resource for the European Union. The goal is to improve skills and competencies of people, improve the quality of and access to continuing vocational training, develop relevant and innovative e-learning content, and promote the social dialogue in vocational training.

Professor Dr. Dr.h.c. Johann Georg Goldammer is head of the Fire Ecology and Biomass Burning Research Group, Max Planck Institute for Chemistry, and Director of the Global Fire Monitoring Center (GFMC), Germany. The GFMC is a contribution of Germany to the United Nations International Strategy for Disaster Reduction (UNISDR). At Freiburg University, he is serving as professor for fire ecology. Since 2005, the GFMC has been an Associate Institute of the United Nations University. J.G. Goldammer is also serving as coordinator the UNISDR Wildland Fire Advisory Group and the UNISDR Global Wildland Fire Network. As one of the core tasks of his lead of the United Nations Economic Council of Europe-Food and Agriculture Organization (UNECE-FAO) Team of Specialists on Forest Fire, he has been the editor of UNECE-FAO International Forest Fire News since 1988. He works closely with the a number of specialized UN agencies and programs, such as FAO and Joint UNEP-Office for the Coordination of Humanitarian Affairs Environment Unit, Emergency Services Branch, and the Advisory Group on Environmental Emergencies. In 2001, the GFMC was awarded the UN Sasakawa Award for Disaster Reduction.

The reintroduction of prescribed fire in nature conservation and landscape management is one of the core activities of the United Nations/Food and Agriculture Organization Team of Specialists on Forest Fire, which is acting as a catalyst for regional networking.

The Baltic Regional Network has been able to leverage the public and political interest in the wildland fire issue due to the recent European incidence of serious and damaging fires. The network has the added advantage of past programs sponsored by various EU organizations. The network has also been able to use the experience and expertise of the personnel at the GFMC, conveniently located within the region.

The Baltic Region is the core region of an activity of the Food and Agriculture/ UN Economic Council of Europe (FAO/UNECE) Team of Specialists on Forest Fire. The team was established in 1981 under the UNECE Trade Division, Timber Section, operating out of Geneva. In 1993 the team was reorganized under the leadership of the GFMC. The team's main task is to foster communication and cooperation among fire scientists, managers, and policymakers within the ECE region.

The main activities embrace the (1) production of *International Forest Fire News (IFFN)*, beginning in 1988 in support of the GFMC; (2) organization of seminars; and (3) promotion of synergistic collaboration among governments, nongovernment institutions, and individuals, especially regarding science and technology transfer.

IFFN, which is published biannually, provides an international information platform on which advances in fire research, technology, and policy development are reported and spread throughout the wildland fire community. Currently, more than 1,000 agencies, research laboratories, and individuals all over the world subscribe to the printed version of *IFFN*. Starting with its 19th issue (August 1998), *IFFN* became available on the Web site of the GFMC. The Web site includes all past issues since 1990, which are organized in 80 country folders and several other special files.

At the May 2004 network meeting in Helsinki, the participants agreed to the "Helsinki Declaration on Cooperation in Wildland Fire Management in the Baltic Region." As part of the declaration, the delegates recommended the Helsinki Plan of Action for Cooperation in Wildland Fire Management in the Baltic Region. This plan of action encouraged governments, with the support of international organizations, to develop or strengthen the following: Bilateral and multilateral agreements on cooperation in wildland fire management, based on international standards as proposed by the International Wildland Fire Summit (2003).

- Investigation of the introduction of the Incident Command System as the international standard for all wildland incident management participating in international or interagency agreements and exchanges.
- Cooperative regional wildland fire research projects and programs.
- Decision-support systems for large fire situations.
- Training/capacity building in wildland fire management.
- Community involvement in fire management.
- Follow-up activities aimed at further promoting collaborative efforts and procedures.

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International Forest Fire News is published biannually and available on the GFMC Web site: *http://www.fire.uni-freiburg.de/* .

Beginning in 1981, a series of thematic seminars and conferences were organized to provide an additional forum and opportunity to provide information and the latest technical development to the organizations and specialists in the region.

- **Fire Suppression Technologies** (Poland 1981).
- **Fire Prevention** (Spain 1986).
- **The Socioeconomic Environment of Fire** (Greece 1991).
- **Forest, Fire, and Global Change** (Russian Federation 1996).
- **The First Baltic Conference on Forest Fires** (Poland 1998).
- **The Baltic Exercise on Fire Information and Resources Exchange—BALTEX FIRE 2000** (Finland 2000).
- **Conference on Forest Fire Management and International Cooperation in Fire Emergencies in the Eastern Mediterranean, Balkans, and Adjoining Regions of the Near East and Central Asia** (Turkey 2004).
- **Regional Baltic Wildland Fire Network Meeting** (Finland 2004).
- **Eastern European, Near East, and Central Asian States Exercise on Wildland Fire Information and Resources Exchange—EASTEX FIRE 2005** (Bulgaria 2005).

Forest Fires in the Mediterranean Basin

Ricardo Velez Muñoz

France, Greece, Italy, Portugal, and Spain in southern Europe and the northern African countries from Morocco to Tunisia and their neighbors make up the Mediterranean Wildland Fire Network. The network membership is also part of Silva Mediterranea group of the United Nations Food and Agriculture Organization and the European Forestry Commission.

Fires in the Mediterranean Basin are more than just a consequence of long periods of drought; they can also be considered an indicator of the socioeconomic differences between the different areas comprising the Mediterranean Basin and their respective levels of development. Because of their greater economic development, the Mediterranean countries in the northern part of the basin in Europe report the highest number of fires and the most extensive areas of fires.

Socioeconomic change in recent decades influences the risk of fires, given that it increases the flammability of the ecosystems. The changes with the greatest repercussions are as follows:

- Rural depopulation, which leads to neglected areas of land. These areas are then invaded by natural and spontaneous vegetation that burns with a greater flammability.
- Concentration of the population in urban areas, which widens the wildland-urban interface.
- Shifts in forestry policy priorities, formerly centered on wood production and other raw materials, are currently focused on nature conservation, landscape conservation, and recreation.

To counter such a risk, during the last two decades the countries known as the "fire club" (France, Greece, Italy, Portugal, and Spain) have greatly improved their fire suppression resources at a high economic cost and, apparently, with acceptable results.

> Socioeconomic changes in recent decades have resulted in altered land use and increased wildfire hazard in the region—a trend revealed by the unprecedented 2007 wildfires in Greece.

Nevertheless, continuing to make large investments to combat fires as conditions to continue to worsen seems almost expended. Thus, new approaches to forest fire defense are required to improve the strategies of prevention and suppression.

Most resources are centered on fire suppression, with the general criteria that all fires must be put out. The principle of fire exclusion and the availability of economic resources have led to important improvements in providing training and equipment for personnel and to the increase in aerial resources. Each summer more than 400 aircraft provide aerial support for fire suppression in the European Mediterranean countries.

Because no computer database accounts for wildland fire suppression, it is difficult to predict how much money is spent each year. Nevertheless, it can be estimated that the five European Union Mediterranean countries invest more than 2.5 billion euros ($3.3 billion) per year in prevention and suppression. Of this figure, 60 percent is earmarked for suppression equipment, personnel, and operations, and the rest is allocated to preventative works.

A new problem becoming increasingly visible each summer is the wildland-urban interface (WUI) fire risk. Many first- and second-residence homes are being built in forested areas of the coast or mountains near large cities. Preventative legislation for this problem is either nonexistent or insufficient. In the future, this problem could consequently reach catastrophic importance.

The summer of 2007 fires in Greece are a tragic demonstration of this problem; many houses burned, killing more than 60 people. This situation, however, also demonstrated the need for cooperation, by shifting resources from west of the basin to the east to help the most risky areas. ■

Ricardo Vélez Muñoz is the director for Fire Management in the Ministerio de Medio Ambiente in Madrid, Spain.

Regional Southeast European/ Caucasus Wildland Fire Network

Nikola Nikolov

The Southeast European/ Caucasus Wildland Fire Network covers the area from Turkey, the Balkans, the southern Caucasus countries, and adjoining Romania and Ukraine.

Welcome banner to the 2004 Southeast Europe Conference.

Regional networking in Southeast Europe was initiated in 2002 and, at that time, was called the Regional Balkan Wildland Fire Network. A major regional activity was the "UNECE/ FAO Conference on Forest Fire Management and International Cooperation in Fire Emergencies in the Eastern Mediterranean, Balkans, and Adjoining Regions of the Near East and Central Asia" (Antalya, Turkey, March 30—April 3, 2004). The conference was followed by a regional forest fire exercise "Eastern European, Near East and Central Asian States Exercise on Wildland Fire Information and Resources Exchange—EASTEX FIRE 2005."

At a regional consultation in the Republic of Macedonia in 2005 members of the Balkan Network decided to invite neighbouring countries and to expand its area of joint activities to Southeast Europe. Subsequently the network was renamed "Regional South East European Wildland Fire Network." With the growing interest of the countries adjoining to the regional, notably in the Caucasus region, it was suggested in 2006 to broaden the geographic scope of the region by including countries of the Caucasus region. Once again the network was renamed and is now the Southeast Europe/Caucasus Wildland Fire Network."

In October 2006, at the request of the United Nations (UN) Security Council and the UN General Assembly, a resolution, the Environmental Assessment Mission to Fire Affected Territories in and around the Nagorno-Karabakh Region, was dispatched to the South Caucasus region. The mission was coordinated by the Organization for Security and Cooperation in Europe (OSCE) and United Nations Environment Programme (UNEP), with a team of experts led by the Global Fire Monitoring Center (GFMC) and the participation of the coordinator of the regional network. The mission assessed the short-term and long-term effects of the fires on the environment in the fire-affected territories and provided recommendations for strengthening fire management capabilities in the region, especially in the territories with unresolved conflicts.

The large and severe wildland fires in the region in 2006 and 2007 provided another critical reason for regional cooperation. As a result, several missions were conducted to assess the environmental and humanitarian consequences of wildland fires.

Nikola Nikolov is a member of the Faculty of Forestry in Skopje, Republic of Macedonia.

In 2007, the Balkan Region suffered a major fire crisis. In the summer of 2007, the jet stream was flowing farther south as compared to average years, allowing low pressure systems to sweep over western/Atlantic Europe and extremely hot air masses to be pulled from Africa, affecting southeastern Europe for weeks with air temperatures often exceeding 45 to 46 °C. All countries of the region, which are experiencing major changes in rural land use and, in general, have inadequate resources for fire management, suffered extreme wildfires. Greece was hit hardest by fires burning nearly 200,000 ha and killing 67 people. The country received an unprecedented wave of support during and after the fire crisis. In most countries of the region, the situation was also very critical. Neighboring countries supported each other with fire suppression resources. The regional network, in cooperation with the authorities of Serbia and the GFMC, conducted a national fire assessment in Serbia (August 2007).

March 19-21, 2007

The Regional Wildland Fire Consultation on "Development of a Strategy on International Cooperation in Wildland Fire Management in the Regional South East European/Caucasus Wildland Fire Network" was held in Sofia, Bulgaria. In the frame of that strategy, these thematic areas of cooperation among countries of the region were proposed:

- Terminology,
- Statistical Database,
- Information Exchange,
- Wildfire Prevention and Use of Fire,
- Early Warning,
- Detection and Monitoring,
- Wildland Fire Suppression,
- Capacity Building/Training Courses,
- Policies,
- Legislation, and
- Strategies and Research.

May 13-17, 2007

One of the most important events for the regional network was the 4th **International Wildland Conference**, held in Sevilla, Spain. Representatives of the countries from the regional network contributed actively to the success of the conference. The regional network also contributed to the regional session: Europe, Southeast Europe, and Mediterranean North Africa and Caucasus.

August 27 and September 7, 2007

Another mission was dispatched to the Republic of Macedonia (Ecological Damage Assessment of the Wildfires in the Former Yugoslav Republic of Macedonia in 2007), a joint mission by the UNEP-Office for the Coordination of Humanitarian Affairs (OCHA) Joint Environment Unit, UNEP, United Nations Development Programme (UNDP), and GFMC. The mission recommended, among other recommendations, to convene a "Regional Balkan Wildland Fire Crisis Conference" (or "Summit"), in which highest level possible government commitment should be sought, under the joint auspices of, among others, UN specialized agencies and programmes (UNDP, UNEP, the Joint UNEP/OCHA Environment Unit, FAO), the European Commission, Council of Europe and Mediterranean Major Hazards Agreement platform, Organization for Security and Cooperation in Europe (OSCE), and North Atlantic Treaty Organization (NATO), and facilitated by the UN-ISDR Global Wildland Fire Network and its regional network, the UN-ISDR Regional Southeast Europe/Caucasus Wildland Fire Network, with the main objective to do the following:

- Address the underlying causes of increasing threats of wildfires to the environment and society, notably the consequences of land-use change and climate variability.
- Outline the need for developing national policies and strategies addressing land use, forestry and forest protection, nature conservation, and fire management.
- Elaborate the agreement for strengthening fire management capabilities in the region through standardized and joint regional training and introduction of improved technologies for wildfire suppression.
- Develop border-crossing mechanisms and agreements on mutual assistance in fire emergency situations.

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Regional Sub-Sahara Wildland Fire Network

Alex Held

To date, participation in the Sub-Sahara Regional Wildland Fire Network has centered in Southern Africa. The network covers the same area as the African Forestry and Wildlife Commission. AfriFireNet and Working on Fire will prepare and organize the 5th International Wildland Fire Conference in South Africa in 2011 (http://www.fire.uni-freiburg.de/WoF/pressroom.html).

AfriFireNet is contributing toward building stronger institutional fire management capabilities and bringing the world's knowledge and technical expertise to communities suffering from the devastating effects of unnatural and unwanted wildland fires.

The Regional Sub-Sahara Wildland Fire Network (AfriFireNet) was founded in 2002 under the umbrella of the United Nations International Strategy for Disaster Reduction. With the support of the Global Fire Monitoring Center, AfriFireNet functions as an independent network of interested individuals and organizations.

AfriFireNet enhances local, national, and regional fire management capabilities by creating a synergy of scientists, managers, and policymakers. The network gives particular emphasis to finding ways to reduce the devastating effects of wildland fires on property, resources, health, and the environment.

AfriFireNet contributes toward building stronger institutional fire management capabilities and bringing the world's knowledge and technical expertise to communities suffering from the devastating unnatural and unwanted effects of wildland fires.

Establishing and maintaining a regional- and national-level wildland fire network for the African continent south of the Sahara is a great and honorable goal, appreciated by most, if not all, organizations, governments, and nongovernmental organizations active in the field of fire management.

Safety and survival training in South Africa.

The regional network has developed information management and dissemination systems, which are used to get information and technical knowledge to the communities and local fire managers.

Working on Fire Is Using the Incident Command System Exclusively in the Agency.

The South African Incident Command (ICS) Working Team was formed in March 2004, following the 3rd International Wildland Fire Conference in Sydney, Australia, 2003. Following the conference recommendations, South Africa decided to adopt ICS for fire management. Each year since 2003, a group of Forest Service personnel has visited South Africa to present Medium and Advanced ICS training to Working on Fire and its partners.

The South African ICS Working Team is made up of the Fire Protection Associations, Forest Industry, National Parks, Cape Nature, Working on Fire, Structural Fire, and Disaster Management. The purpose of the ICS Working Team is to expand operational cooperation and coordination of veld, forest, and prescribed fire operations with the utilization of the ICS. The South African ICS Working Team developed ICS standards for South Africa veld and forest fire organizations: The *Veld, Forest and Prescribed Fire Qualification System Guide."*

Alex Held is the coordinator of AfriFireNet and a senior staff member for Working on Fire International, Nelspruit, South Africa.

The lack of sustainable funding, however, is still evident and, as a result, AfriFireNet cannot hold regular network meetings and their support members cannot attend capacity-building training courses or relevant meetings. Despite all the obstacles and difficulties, by 2007 AfriFireNet members had conducted, facilitated, and participated in several local, national, regional, and international fire training workshops. They had also participated in wildland fire science programs (notably the Savanna Fire Ignition Research Experiment [SavFIRE] project 2006-2010) and fire management exchange programs and had shown their regional support by signing a bilateral agreement with the South African government. Because of the tremendous support of the South African Department of Water and Forestry Affairs, the mutual assistance process lends itself to successfully managing border-crossing fires and serves as a model for other African states.

In November 2007, the Global Observation for Forest and Land Cover Dynamics held a Fire Early Warning Systems Workshop in Africa (University of Ghana, Legon, Accra). The participants agreed to expand the activities and focus of AfriFireNet to include West Africa.

AfriFireNet and Working on Fire will prepare and organize the 5th International Wildland Fire Conference in South Africa in 2011 (http://www.fire.uni-freiburg.de/WoF/pressroom.html).

Working on Fire activities compliment the AfriFireNet, and the Working on Fire-AfriFireNet principles and guidelines are visibly adapted and replicated throughout southern Africa. Strict adherence to the training procedures is another reason why Working on Fire has achieved significant successes as a poverty alleviation program and become a valuable social institution.

Training standards meet and exceed the Forest Protection Units Standards. The program has adapted standards from the United States that are considered to be among the best in the world.

The Task Book System lists tasks a candidate must complete before he or she is regarded as competent. A strict rule practiced by Working on Fire states that a veld firefighter's life should never be risked.

It would be ideal for all veld fire fighters in the country to be compliant with the internationally recognized Red Card that indicates that the holder is a competent and fit firefighter trained in firefighting skills, fire behavior patterns, and first aid, among other capabilities.

The Basic Fire Fighting course includes Unit Standards one, two, and three of the Forestry Industry Education and Training Authority. These are recognized by the National Qualifications Framework as credits towards a forestry qualification.

Calculating the Lowveld Fire Danger Index, Nelspruit, South Africa

Working on Fire

However great the ambition, the fact remains, AfriFireNet has never had an operational budget and depends upon the goodwill and funding from supportive partners. In 2005, the Working on Fire program (http://www.workingonfire.org/), a founding member of the network, offered to act as the host organization for the network and to provide office space and other resources—a greatly appreciated contribution. More information on Working on Fire can be found on the Web at: http://www.workingonfire.org/.

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Fire Situation in Northeast Asia and the Activities of the Regional Northeast Asia Wildland Fire Network

Leonid Kondrashov

The Regional Northeast Asia Wildland Fire Network covers a vast forested area that includes China, Japan, Korea, and Russia.

Increasing vulnerability of peat and forest ecosystems to fire and transboundary wildland fire smoke pollution are the key problems in the region.

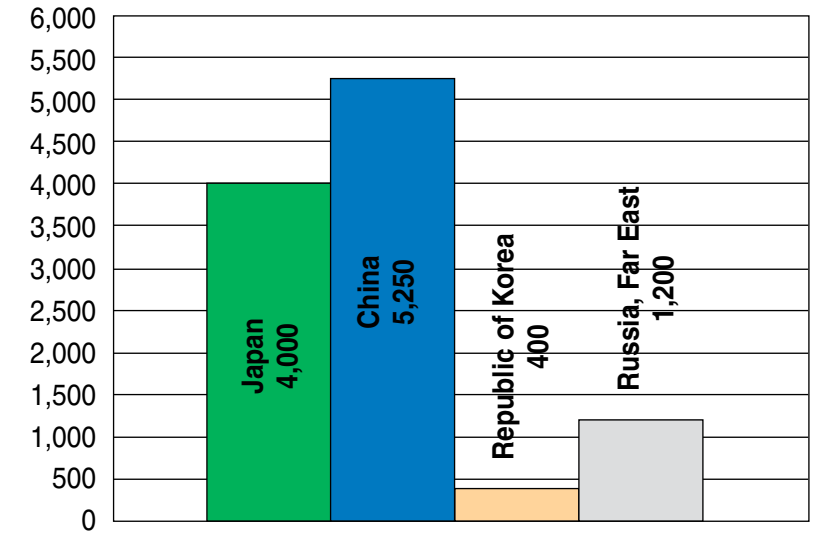
The Northeast Asia (NEA) region includes China, Japan, the People's Democratic Republic of Korea, the Republic of Korea, and the far east of the Russian Federation. The Northeast Asia Wildland Fire Network covers an area of 16.4 million kilometers." Most wildland fires in this region occur as a consequence of human activity.

Increasing vulnerability of peat and forest ecosystems to fire and transboundary wildland fire smoke pollution are key problems in the region. Agriculture, the collection of medical and edible plants, industrialization accompanied by recent economic growth, hiking, recreation, tourism, etc., are the main causes of the area's wildland fires. The currently observed trend of global warming involves a change of regional climate patterns. The last decade's trends show that wildland fires in the NEA countries have increased in scale, frequency, area burned, the number of big fires, economic losses, and fire suppression cost—but each country varies greatly. With the growing fire effect on nature and society, people are more alert to the growing fire problem and the transboundary character. This level of awareness has created a greater demand of cooperation between the NEA nations and their international partners.

Organization Comes Together

In March 2004, the Korea Forest Research Institute (KFRI) in the People's Democratic Republic of Korea and the Global Fire Monitoring Center (GFMC), with participation of the United Nations Food and Agriculture Organization and a group of forest fire specialists from China, Japan, the Republic of Korea, and the Russian Federation, founded the Regional Northeast Asia Wildland Fire Network. The group decided that the network would be coordinated by KFRI.

Between 2004 and 2006 the network conducted three meetings in Khabarovsk, Sendai, and Seoul



Leonid Kondrashov is a researcher for the Pacific Forest Forum in Khabarovsk, Russian Federation.

The network goals include enhancing international cooperation in wildland fire management research, development, and capacity building and sharing knowledge, resources, and mutual support.

The network's cooperation is based on the principle of partnership among the participating countries and the international community.

- The network members should take advantage of the accumulated fire management expertise and international community cooperation.
- Its members must ensure that the outcomes of each dedicated meeting, conference, and symposium reach the decisionmakers, to advocate that they provide the necessary support.
- Member countries should continue to strengthen their commitment to promote regional cooperation, including joint investigations, joint fire management demonstration projects, consultations, and conferences.
- National Voluntary Fire Management guidelines discussions should be held with the inclusion of civil society and all institutional stakeholders.
- Member countries should hold discussions on the development of national voluntary fire management guidelines that include members of civil society and all institutional stakeholders.
- Education and awareness campaigns related to forest fire prevention should be a continuing effort by governments.
- A globally accepted fire management glossary of terminologies and definitions must be translated into the most universal languages and must be placed on the priority list of actions.
- National authorities and international organizations must provide financial support to the UN International Strategy for Disaster Reduction (UN-ISDR) Global Wildland Fire Network and its secretariat and to the GFMC.
- Countries belonging to the UN-ISDR Regional Wildland Fire Networks must contribute toward creating a Global Vegetation Fire Information System, an endeavor that will include the application of new technologies and advanced satellite systems for detecting and evaluating vegetation fires.

and two consultations in Irkutsk and Tokyo, in which participants shared information, experience, and research and development work; adopted a mission statement; elaborated plans of future work, cooperation, and programming activities; and determined the regional network is needed to provide future institutional capacity building.

The meetings were usually combined with international fire conferences, which provided an opportunity to involve a wider discussion of urgent questions.

The network's cooperation is based on the principle of partnership among the participating countries and the international community.

At the 4th International Wildland Fire Conference, representatives of the region urged authorities and international organizations to provide financial and technical assistance to the Global Wildland Fire Network and, in particular, to the Regional Wildland Fire Networks.

To realize this strategic plan, the network must develop a timetable of concrete actions in fostering international cooperation. One of the important steps is that each country organizes followup work at the national level, including annual meetings of the Regional Wildland Fire Networks and joint implementation projects. ■

Wildland Fires in South Asia: Latest Developments and a Future Strategy

Sundar P. Sharma

The South Asia Regional Wildland Fire Network includes the countries of Bangladesh, Bhutan, India, Nepal, and Sri Lanka.

Fires affecting sensitive mountain ecosystems have considerable consequences on secondary disasters such as landslides, mudslides, erosion, increased water runoff, and flash floods.

The South Asia Regional Wildland Fire Network—the youngest regional network of the United Nations International Strategy for Disaster Reduction (UN-ISDR) Global Wildland Fire Network—was founded with the financial support of the Global Fire Monitoring Center (GFMC) and cosponsored by the International Centre for Integrated Mountain Development in Kathmandu, Nepal, in April 2007. Establishing a regional network followed from the recommendations in the Declaration of the Tenth South Asian Association for Regional Cooperation Summit on Environment (Colombo, 1998). Participants from Bangladesh, Bhutan, India, Nepal, and Sri Lanka attended and contributed to the foundation meeting. Nepal chairs the network.

Sundar P. Sharma is a Soil Conservation Officer at the Department of Water Induced Disaster Prevention in Kathmandu, Nepal, and is the coordinator for the South Asia Wildland Fire Network

South Asia community-based fire management

Phases	Activities	Examples	Remarks			
Pre-forest fire	Preparedness	Awareness raising	**Preventive measures**	**Managing Measures**	**Ensure people's participation and livelihood**	**Development of institutional structures, planning, and policy and legislation**
		Construction of fire-lines				
		Prescribed burning Arrangement of fire-fighting tools and the traning of fighting crews Risk assessment				
		Insurance				
		Maintain store-house with essential materials				
During the fire	Response	Fire detection	**Suppression Measures**			
		Prompt Mobilization of fire crews Fire fighting Back firing				
		Wildland fire fighter safety				
Post-forest fire	Recovery	Mopping-up Revegetation of burnt areas Shelter, food, water, medicine, counseling to the victims	**Rehabilitation Measures**	**Rescue and relief**		

Current Situation

During the long and intense dry seasons occurring annually in the region, wildfires are a regular phenomenon, many of them having a potential to cause major damages; e.g., serious degradation of forests, changes of ecosystem properties, and deterioration of social and economic conditions in some land-use systems and natural vegetation types. The ecosystems and society are very vulnerable to wildfires, in general, and to the secondary disasters, such as landslides and flash floods, that follow disastrous wildfires.

A lack of fire research and management capability exists in the region, including monitoring, early warning, and ecological and socioeconomic impact assessment. Until the beginning of the networking process, limited international cooperation in fire management occurred.

It has been recognized that the involvement of local communities, which are suffering most by the consequences of inappropriate burning practices and wildfires, is crucial to reduce the adverse impacts of fire. Thus, interest is increasing in promoting concepts of Community-Based Fire Management (CBFiM), which will contribute to raising awareness and creating local capacities to protect sustainable vegetation cover and productivity. This fire management approach, in turn, reduces poverty by maintaining the resources and crops that support livelihoods in the rural communities.

Visions and Strategic Considerations

The future direction of the South Asia Regional Wildland Fire Network, as expressed at its foundation meeting and the regional session held during the 4th International Wildland Fire Conference in Sevilla, Spain, May 2007, lays out a vision to enhance and strengthen bilateral/multilateral and international cooperation in wildland fire management for creating synergies and sharing knowledge and technical and human resources among countries in the region by accepting and promoting principles, norms, rules, and decision making procedures within a guiding framework that individual countries agree on.

It has been recognized that the involvement of local communities, which are suffering most by the consequences of inappropriate burning practices and wildfires, is crucial to reduce the adverse impacts of fire.

First Steps Taken

A number of steps were taken in 2007 to further develop the concept of community participation in fire management. In October 2007, a first training course for two selected communities was given in Hetauda, Nepal, followed by the development of a prototype district forest fire management plan. At a National Round Table on Fire Management for Nepal, sponsored by the GFMC in December 2007, these projects were presented as models for nationwide application. In 2008, the methods of these local, microregional, and national approaches will be presented in an advanced wildland fire management training course for the whole South Asian region.

Even thought the network is young and just beginning to take the first steps in raising community awareness and building capacity, the work that is under way shows promise. Using the 1998 Colombo Summit on Environment as a basis for political support and working directly with communities to gain local understanding and participation, the new network brings together all levels to address this critical regional problem.

Sundar Sharma can be contacted at e-mail: sharmasp1966@yahoo.com ■

Australasia's Challenges and Successes

Gary Morgan

The Australasian Wildland Fire Regional Network includes Australia and New Zealand. The network is coordinated by the Australasian Fire Authorities Council. The Council membership includes many Pacific Island nations, and planning is ongoing to establish a Pacific Island Network that would include Hawaii and the U.S. territories in the Pacific.

In many parts of Australia and New Zealand, the combination of topography, vegetation, and climate produces one of the most severe fire environments on Earth. Changes in philosophical and organizational approaches to wildland areas over the past 40 years, the expansion of urban populations into the hinterland, and, more recently, the uncertainties associated with global warming present decisionmakers with considerable dilemmas. In addition, park and forest management agencies currently are confronted, in many areas, with prolonged drought, increasing strains on forested water catchments, and, in a number of situations, an increasing reliance on assistance from volunteer-based rural fire agencies.

Gary Morgan is the chief executive officer for the Bushfire Cooperative Research Centre in East Melbourne, Victoria, Australia.

The past 25 years have seen a considerable shift of publicly owned forests and woodlands into national parks and related categories.

Australia's and New Zealand's Confronting Challenges

Resources for Park and Forest Management

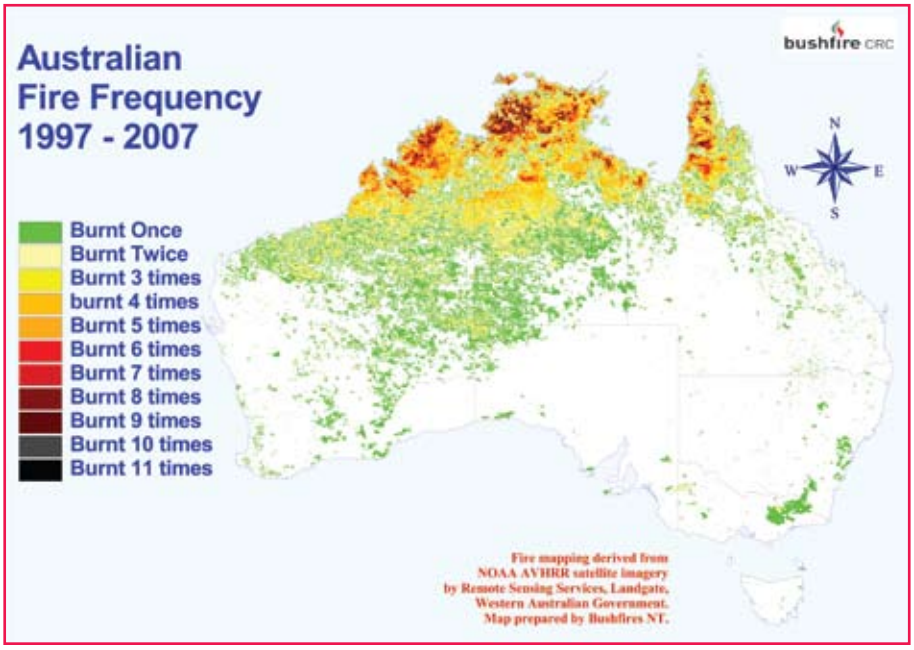
The past 25 years have seen a considerable shift of publicly owned forests and woodlands into national parks and related categories. This change has been associated with the removal of much of the native forest-based timber industry. The change in land status has often resulted in a less-than-active land management. For example, the creation of new reserves has often resulted in a gradual reduction in the access track network and reduced prescribed burning levels.

In general, governments have not increased the budgets of park agencies nearly as proportionate as they increased the amount of land the agencies are now required to manage.

The resultant skill reduction associated with the removal of the timber industry and ongoing resource shortages are exacerbated by increasing numbers of experienced fire and land management personnel reaching retirement age.

The Use of Prescribed Fire

The areas treated with prescribed fire in most southern Australian



jurisdictions have fallen considerably in recent decades. The reasons for this reduction include the reduction in funding and skilled personnel available to land management agencies, the dramatic growth of built assets in the urban interface, the risk-adverse nature of land management agencies, and political and community attitudes toward fire.

The Extent and Value of Assets in the Rural-Urban Interface Zone

The largest loss of buildings in the rural-urban interface zone occurred during fires in 2003 around the Australian capital, primarily as a result of falling embers. Despite recommendations made during a national inquiry to make greater use of the *Australian Standard for the Construction of Buildings in Bushfire Prone Areas* in the rural-urban interface, many governments seem reluctant to pursue this matter for either new or existing buildings.

Technology in many of its forms has greatly improved the efficiency and effectiveness of bushfire management in Australasia.

Firefighter Safety, Risk Minimization, and the Legal System

Concerns within the land management community that ongoing changes to occupational health and safety legislation and the involvement of the legal system in firefighting are increasing may have cumulatively moved the suppression effort balance from a focus on safety to one of risk avoidance.

A 2003 national bushfire inquiry observed that "Coronial [legalistic] investigations into operational decisions may reinforce blame and risk avoidance, rather than improving a shared understanding and promoting a learning culture."

The impact and management of firefighter fitness and fatigue increasingly receive agency attention.

Technology Use Escalating

Technology in many of its forms has greatly improved the efficiency and effectiveness of bushfire management in Australasia. Given the escalating cost of fire suppression, fire managers are performing more rigorous evaluations of various technologies and their effectiveness and efficiency—particularly for aircraft.

Meeting Community Expectations

In recent years, southern Australia has seen several large remote fires of lengthy duration. As a result of good local preparedness and fire agencies concentrating on asset protection, these fires resulted in limited private property damage and minimal human effects.

To a degree, these fires now define the wider community's perception of bushfire. Significant fires in the rural-urban interface, around larger cities and regional centers potentially present fire managers with a dilemma.

How do firefighters control a potentially uncontrollable wildfire and mitigate dangers with increasing public and political pressures?

Climate Change

With much of southern Australia currently in the grip of a decade-long drought, the role of underlying moisture deficits in the fluctuating nature of Australia's experience with bushfire is notable. Equally perhaps, international scientific opinion has confirmed that significant climate change is under

Networking To Gain Support

In 1993, the Australian Fire Authorities Council was established to improve the collaboration and coordination of efforts among those Australian agencies with a responsibility for the protection of life and property from fire and other emergencies. The membership of agencies from the greater region changed the Australian organization's name to the Australasian Fire Authorities Council in 1996.

The current membership of AFAC stands at 24 full members and 11 associate members from throughout the Australasia-Pacific region. AFAC aims to promote and coordinate activities in fire prevention, management, and research through five strategy groups. At its 2004 council meeting, AFAC officially became part of the Global Wildland Fire Network.

way. Drought and climate change, however, should not be used as reasons to avoid assessing Australia's forest and woodlands management.

Research

In 2003, a Bushfire Cooperative Research Center (CRC) became one of 56 public-private research centers operating in Australia. The formation of the Bushfire CRC was, and remains, a major initiative of fire and land management agencies in Australia and New Zealand. The Bushfire CRC's current funding, however, is due to expire in 2010. The Australasian Fire Authorities Council (AFAC), the peak industry body, remains determined that fire and land management policy must continue to be underpinned by high-quality research.

Regarding the immediate future—recent national and international forums have shown a growing consensus that general society is mostly unconcerned about the bush (nature) while those living in fire-prone areas pay a reccurring price in terms of social disruption, damaged assets, environmental degradation, and, at times, loss of human life.

In the case of Australasia and in the light of global warming, it seems increasingly futile to develop policies in areas ranging from water and biodiversity conservation to urban planning, carbon sequestration, and maintenance of key aspects of indigenous culture without first critically analyzing fire management considerations. ■

Web Sites on Fire*

Global Fire Monitoring Center

If you only have one Web site on international fire activities tagged as a favorite, the Global Fire Monitoring Center (GFMC) should be the one. The GFMC is hosted by the Max Planck Institute at the University of Freiburg in Germany and is a joint venture with the United Nations International Strategy for Disaster Reduction (UN-ISDR) and the United Nations University. As the name implies, the GFMC Web site is a source of fire information from various remote-sensing sources of burned area status and early warning with information on emissions and air quality. The site provides anyone with a link to the Internet information from a wide variety of satellite systems.

The site is much more than just early warning and fire occurrence information. The *Global Wildland Fire Network; Global Fire Inventories and Models; International Fire Management Programs;* and *Fire Glossaries, Literature, and Software* are only a few of the titles on the homepage.

Each topic has numerous links to other sites. The sites include global organizations and national fire agencies, such as the National Interagency Fire Center in Boise. There are also links for meetings, training, and conferences, including reports and summaries from past sessions.

The format of the Web site is user friendly. Each topic has a summary either prepared by the GFMC staff or taken from the original source with links to the referenced sites. This arrangement can save the user time because it provides an idea of the content before the user navigates to a site.

Found at <http://www.fire.uni-freiburg.de//>.

FAO Fire Management

Within the Forestry Department of the Food and Agriculture Organization (FAO) of the United Nations is the Fire Management Section. This organization's Web site has several useful reference documents on fire management.

The key document is the *Fire Management Strategy,* made up of four components: Voluntary Guidelines, Fire Management Action Alliance, Global Assessment 2006, and the Review of International Cooperation 2006. All the documents are in portable document format (pdf) and can be downloaded and printed. The guidelines are available in English, French, Russian, and Spanish.

Other sections on the site include examples of international agreements and terminology. The fire management terms include definitions and translations to French, German, and Spanish. Several working papers discuss various fire management topics.

This Web site is found at <http://www.fao.org/forestry/site/firemanagement/en.>

*Occasionally, *Fire Management Today* briefly describes Web sites that the wildland fire community has brought to our attention. Readers should not construe the description of these sites as exhaustive in any way or as an official endorsement by the Forest Service. To have a Web site described, contact the managing editor, Karen Mora, at 970-295-5715 (tel.), 970-295-5885 (fax), or kmora@fs.fed.us (e-mail).

Fire Situation in Central Asia and Regional Central Asia Wildland Fire Network Activities

Tsevee-Oiroy Chuluunbaatar

The Central Asia Regional Network covers the area from Afghanistan, Kazakhstan, Kyrgyzstan, Tajikistan, and Russia to Mongolia.

The region is characterized by continental climate with extreme fire seasons affecting forest and steppe ecosystems.

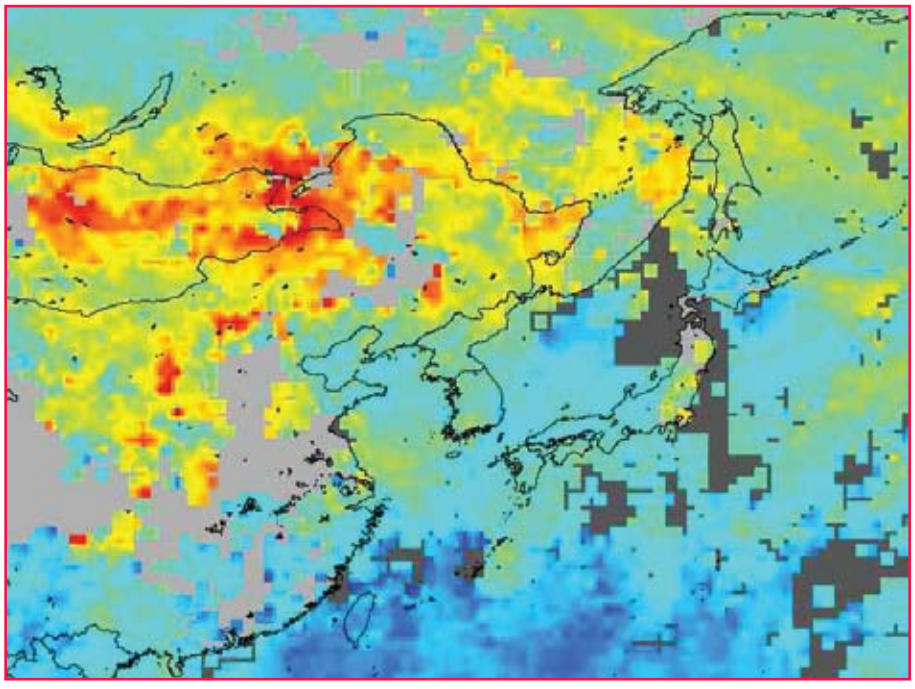
In the past 15 years, many countries of Central Asia have witnessed a growing number and increasing size of wildfires in forest and nonforest ecosystems. Most of the fires were caused by humans but, in sparsely populated areas, many were ignited by lightning.

These fires have caused considerable ecological and economic damage, and some have had transnational effects such as smoke pollution, loss of biodiversity, and forest degradation at the landscape level. The depletion of terrestrial carbon caused by fires burning under extreme conditions in some vegetation types—especially in temperate, hemiboreal, and boreal peatlands—is an important disturbance factor in the global carbon cycle.

Projected trends of climate change effects on vegetation cover and fire regimes, as well as observed demographic and socioeconomic trends, suggest that fire may continue to play a major role in the destruction of vegetation cover in Central Asia, resulting in accelerating formation of steppe ecosystems that are replacing forests. Throughout the region, human populations located in or around forest environments have become increasingly vulnerable.

Transboundary Cooperation

In 2004, in Antalya, Turkey, the Conference on Forest Fire Management and International Cooperation in Fire Emergencies in the Eastern Mediterranean, Balkans, and Adjoining Regions of the Near East and Central Asia was held, under the auspices of the Global Fire Monitoring Center (GFMC) and the United Nations Economic Commission for Europe (UNECE) Trade Development and Timber Division. During the conference, attendees proposed that a Regional Wildland Fire Network would be a valuable tool in addressing transboundary cooperation



Carbon monoxide concentration originated by smoke from fires in the Transbaikal Region from May 3 to 8, 2003 (MOPPIT on Terra – Source: NASA)

Tsevee-Oiroy Chuluunbaatar is a professor for the Institute of Botany, Mongolian Academy of Sciences, Ulaanbaatar, Mongolia.

September 2005 marked the first Regional Central Asia Wildland Fire Network held in Irkutsk, Russian Federation. At this meeting, the delegates came to the following conclusions:

- Eurasia's/Central Asia's boreal forest is significantly important to how the Earth's climate functions; and, because forest cover and terrestrial carbon storage potential are continuously and predictably decreasing, we must address this problem vigorously—at national and international levels.
- Forest and fire management is the responsibility of all countries, and it is in our best interest to be engaged. Some countries of Central Asia, however, are not in the position to ensure sustainable fire management practices. Weak institutional fire management capacity and limited law enforcement make it extremely difficult to curtail illegal logging and wildfire destruction.
- The international community must provide aid to the Central Asia countries by creating an efficient forest and fire management organization. By increasing their fire management capabilities, only then can these countries begin to efficiently preserve the multifunctional role of forests and other vegetation—including the wetlands.
- The international conventions, other international negotiations, and the recent international ministerial meetings confirm that the international community is willing to cooperate in sustainable forest and fire management.
- International cooperation and targeted fire management projects and programs must rely on accurate and meaningful fire data and information to assess the current fire situation and trends. Fire statistics from individual countries are often incomplete and inconsistent, which makes it difficult to compare data due to different methodologies used and lack of coverage. Satellite remote-sensing products are not yet systematically used to assess the extent and effects of fire, and currently, no agreement exists regarding which particular system provides the best economic and environmental fire damage assessment.
- International cooperation is essential in developing internationally or regionally accepted standards and protocols. Networking on an international level will enable us to share knowledge, expertise, and resources in joint fire management projects and programs. Most fire-prone forests and other vegetation in Central Asia are located in countries where Russian is the official or prevailing language. With that, training materials, guidelines, terminologies, etc., could easily be shared among countries.

in wildland fire management and fire research. The conference concluded successfully with the official "Antalya Declaration on Cooperation in Wildland Fire Management in the Balkans, Eastern Mediterranean, Near East and Central Asia."

In July 2004, in Almaty, Kazakhstan, representatives from Kazakhstan, the Russian Federation and GFMC met with the Regional Central Asian Forest Congress, Bishkek, Kyrgyz Republic. These two groups came together to continue the discussions about transboundary cooperation. During the Central Asian Forest Congress, the forest services of Kyrgystan, Uzbekistan, Tajikistan, and Kazakhstan resolved to endorse Global Wildland Fire Network as the catalyst to further develop international wildland fire accord.

Since 2007, Mongolia and the Russian Federation have participated in both the Eurasian Fire in Nature Conservation Network (EFNCN) and in the European Union (EU)-sponsored FIRE PARADOX program to investigate the use of prescribed fire in nature conservation, biodiversity management, wildfire prevention, and suppression.

In January 2008, in Freiburg, Germany, both Mongolian and Russian delegates participated in the Symposium on Fire Management in Cultural and Natural Landscapes, Nature Conservation and Forestry in Temperate-Boreal Eurasia. The GFMC organized the meeting and sponsored the first experiment where attendees viewed a prescribed fire demonstration that showed the benefits of reducing wildfire hazard in a typical Central Asian pine forest.

In May 2008, the same group met in Mongolia where the First International Central Asia Fire Experiment took place. This Mongolian experiment was a follow-up to the January experiment in Germany and provided an opportunity to view the results at home. ■

Forest Fires in the Caribbean

Raúl González Rodriguez

The Caribbean Regional Network members are the island nations with areas of forest land affected by wildland fires—Cuba, Dominican Republic, Jamaica, Puerto Rico, and Trinidad and Tobago.

The Caribbean is made up of numerous islands that, together, comprise 23 countries. Of the region's total land surface, approximately 15 million acres (6 million ha) are covered by forests, corresponding to nearly 26 percent of the land surface. This forest-covered surface, as a whole, represents a mere one-tenth of a percent of the world's forest cover. Cuba and the Dominican Republic together account for 77 percent of the region's forests.

The abundance of endemic plants in the region constitutes the greatest share of biological diversity in the Atlantic Ocean basin, followed by the coastal regions of North, Central, and South America. The singular characteristics of its wetlands and the importance of the vegetation cover to local economies, particularly the tourism sector, make the protection of forest cover a key concern for countries in the region.

An increase of agricultural land use—sugar cane and, to a lesser extent, coffee and cotton plantations—has greatly contributed to the diminishing area of forests in the region. Cattle raising and planting of other crops have also extended across the entire region.

Natural and Human-Caused Destruction

Forest cover has also been reduced by hurricanes—highly destructive events that cause physical damage to the forest resources. Fallen, broken, or uprooted trees leave behind large quantities of combustible materials ready to ignite, favoring the initiation and propagation of wildland fires.

Other causes of wildland fires include land-clearing fires, pasture improvement by burning grasslands, establishment of new human settlements or development, human conflicts employing fire, careless campers, and children. Of course, fires sometimes result from natural events. Limited statistical data and information on forest fire occurrence and impacts in the Caribbean, however, leave many open questions about the overall fire situation in the region.

Management Strategy

A cooperative regional strategy has been developed to mitigate the negative effects of fires in the region. The Fire Management Cooperation Strategy for the Caribbean 2006–2011, developed jointly with the representatives of the most fire-affected countries of the Caribbean and supported by the United Nations Food and Agriculture Organization and the Global Fire Monitoring Center, aims to encourage and coordinate the exchange of knowledge, experience, and technical and human resources among Caribbean countries through a consolidated regional mechanism. This mechanism is a bilateral and multilateral fire management cooperation effort for reducing the social and economic impacts of fires that affect forests and other types of vegetation in the region.

Raúl González Rodriguez can be contacted at e-mail: mfuego@mail.mn.co.cu. ■

Table 1. *Incidence of fires and affected surfaces across Caribbean countries (2000–2006)*

Country	Number of Fires	Damaged Surface Acres (ha)	Damage Index Acres (ha fire^{-1})
Barbados	3, 932	-	-
Cuba	2,303	184,567 (74,692.00)	79 (32)
Dominica	607	-	-
Dominican Republic	1,033	124,197 (50,261.09)	124 (50)
Trinidad and Tobago	964	27,755 (11,232)	30 (12)
Total	8,839	336,519 (136,185.09)	37 (15)

Raúl González Rodríguez is a coordinator for the United Nations International Strategy for Disaster Reduction *Regional Caribbean Wildland Fire Network in Jefatura Nacional del Cuerpo de Guardabosques, Cuba.*

Fire Management Today 2007 Photo Contest Overview

Fire Management Today received 285 images from 69 people for our 2007 photo contest. Thanks to everyone who contributed their best fire-related images to the 2007 competition.

We asked people to submit images in six categories:

- Wildland fire
- Prescribed fire
- Wildland-urban interface fire
- Aerial resources
- Ground resources
- Miscellaneous (fire effects, fire weather, fire-dependent communities or species, etc.)

After the contest deadline (the first Friday in October), we evaluated the submissions and eliminated all technically flawed images, such as those with date stamps or low resolution. Despite technical flaws, many of these images were otherwise outstanding.

Next, two fire safety experts reviewed the images to ensure that they did not show unsafe firefighting practices (unless that was their purpose). If an unsafe practice was evident, we disqualified the image from competition.

Lastly, three judges reviewed, scored, and ranked the remaining images based on traditional photography criteria. They asked questions such as:

- Is the composition skillful and dynamic?
- Are the colors and patterns effective?
- Does the image tell a story or convey a mood? ■

Thanks to Fire Photo Experts

We assembled an excellent panel of judges, people with years of photography experience, and we made sure that fire safety experts evaluated the photos. We appreciate the time and skill that our panel members gave to this effort! The panel included:

Safety Experts

- **Tammy Denney**, a Web master for the Forest Service, Fire and Aviation Management, Washington, DC, has been with the agency for more than 20 years. As Web master, Denney develops and designs specialized fire-related communication materials for a broad audience. Her diversified experience includes national contracting, budget and fiscal management, public affairs, wildland fire safety, and fuels program analysis.
- **Paul Schmidtke**, the branch chief for Cooperative Fire Programs in the National Headquarters Office, has been with the Forest Service for 20 years, starting his career on the Huron-Manistee National Forest. Schmidtke served in various fire management and natural resource positions on the Lincoln National Forest.

Judges

- **Lane Skew** is an editor with the Forest Service, Rocky Mountain Research Station, Fort Collins, CO. Evaluating photographs is an integral part of Skew's job. Outdoor magazines, books, brochures, and other media have published Skew's photographs over the past 16 years.
- **Roy Mite** is an applications developer and analyst for the Forest Service, NRIS-FSVeg, Fort Collins, CO. Having spent the first half of his career on ranger districts in Regions 1 and 9, he maintains an active interest and involvement in wildland and prescribed fire.
- **Reghan Cloudman** is a public affairs specialist on the Arapaho and Roosevelt National Forests and Pawnee National Grassland. She spends much of her time working on issues management, media and legislative relations, fire information, event planning, facilitation, and the Web.

Thanks for entering!
WE LOOK FORWARD TO RECEIVING YOUR CONTRIBUTIONS in OUR NEXT PHOTO CONTEST.

Wildland Fire - 1st place
Cottonwood Engine. Washington State DNR engine holds the road on the 2007 Cottonwood Fire, (WA State DNR) outside of Asotin WA. Photo taken by Aaron Black-Schmidt, Okanogan & Wenatchee National Forests, Ardenwoir, WA. (Photo 55-04)

Wildland Fire – 2nd place
Blow up of Ahorn Fire - July 15, 2007 from Big Prairie Ranger Station in the Bob Marshall Wilderness, Flathead National Forest; Spotted Bear District, Montana. Photo by Eric VanderBeek, Flathead National Forest. (Photo 40-01)

Wildland fire – 3rd place
Rafters make their way through the burning corridor of the Raines Fire on the Salmon River, August 3, 2007. Photo taken by Vicki Saab, U.S. Forest Service, Rocky Mountain Research Station, Bozeman, ID. (Photo 53-03)

Prescribed fire – 1st place
Heat waves distort the view of firefighters on the Vigil & Abeyta Mesas Prescribed Burn, April 25, 2006, Pagosa Field Office, San Juan Public Lands, Colo. Photo taken by Mark D. Roper, San Juan National Forest, CO. (Photo 43-03)

Prescribed Fire – 2nd place
This is a line of Aerial Ignition Spheres igniting a marsh on the head waters of the Indian Rive Lagoon. Merritt Island National Wildlife Refuge, FL, 2007. Photo taken by Jeff Schardt, U.S. Fish and Wildlife Service. (Photo 57-15)

Prescribed Fire – 3rd place
Fire is restored to a fire-adapted ecosystem through the Trimble Point Prescribed burn on the San Juan National Forest, June 10, 2007. Photo taken by Eric La Price, USFS, Delores, CO. (Photo 47-10)

Wildland/Urban Interface

Wildland Urban Interface – 1st place
Homeowners pay tribute to their beloved home that was destroyed by the 3,100 acre Angora Fire. This human-caused fire, which destroyed 254 homes near the community of South Lake Tahoe, was started by an illegal warming fire. Angora Fire, California; June 2007. Photo taken by J. Michael Johnson, National Park Service, Omaha, NE. (Photo 69-01)

Wildland Urban Interface – 2nd place
The Black Cat Fire moved out of the timber down a dry, grassy slope into the wildland urban interface a few miles northwest of Missoula, MT. August 2007. Photo taken by Mark D. Roper, San Juan National Forest, CO. (Photo 43-08)

Wildland Urban Interface – 3rd place
Kennedy Space Center, Vehicle Assembly Building (VAB), where space shuttle is assembled. Smoke rising through the cumulous layer during an RX Burn. Merritt Island National Wildlife Refuge, FL, 2007. Photo taken by Jeff Schardt, U.S. Fish and Wildlife Service. (Photo 57-02)

Aerial resources – 1st place
A tanker makes a retardant line for a burnout operation on the 2007 Poe Cabin Fire, Wallowa-Whitman National Forest, ID. Photo taken by Aaron Pool, Tonto National Forest, Phoenix, AZ. (Photo 64-02)

Aerial Resources – 2nd place
206 B3 Helicopter with Premo Mark III Machine utilized for aerial ignition during a prescribed fire on the Tulelake National Wildlife Refuge, CA, January 30, 2007. Photo taken by Troy Portnoff, U.S. Fish and Wildlife Service, Tulelake, CA. (Photo 67-03)

Aerial Resources – 3rd place
Retardant Drop, Sweat Farm Road Fire, 2007, Waycross, GA. Photo taken by Clarence (Buck) Kline, Georgia Forestry Commission, Valdosta, GA. (Photo 32-11)

Ground Resources

Ground Resources – 1st place
Crew Waiting and Ready on the Roundabout Fire, Atkinson County, 2007, Pearson, GA. Photo taken by Clarence (Buck) Kline, Georgia Forestry Commission, Valdosta, GA. (Photo 32-02)

Ground Resources – 2nd place
Firefighters spray foam on a steep handline in preparation for back burn operations along Highway 33 near Wheeler Gorge, CA, at the 2007 Zaca Fire on Los Padres National Forest. Photo taken by Catherine Hibbard, U.S. Fish and Wildlife Service, Hadley, MA. (Photo 41-01)

Ground Resources - 3rd place
Jeglum Woodbury DiTommaso Portrait. Firefighters Sarah Jeglum, Chris Woodbury, and Allison DiTommaso of the Entiat IA crew pose on the 2006 Nason Creek IA, Wenatchee River RD, Okanogan-Wenatchee N.F. WA. Photo taken by Aaron Black-Schmidt, Okanogan & Wenatchee National Forests, Ardenwoir, WA. (Photo 55-12)

Miscellaneous – 1st place
Severe soil erosion and water runoff following the January 2007 Upper Waiohuli Fire, Kula Forest Reserve, Maui Island, Hawaii; February 2007. Photo taken by Michael Constantinides, Division of Forestry and Wildlife, Department of Land and Natural Resources, Honolulu, HI. (Photo 42-01)

Miscellaneous – 2nd place
Endangered Coastal Scrub habitat is burned for the threatened Florida Scrub Jay. Merritt Island National Wildlife Refuge, FL, 2007. Photo taken by Jeff Schardt, U.S. Fish and Wildlife Service. (Photo 57-12)

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