

International cooperative efforts to address the problem of fires burning in the radioactively contaminated forests in the Chernobyl Exclusion Zone.

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An important impact of the accident at the Chernobyl Nuclear Power Plant in 1986 was to cover 260,000 ha of forest and former agriculture lands with radioactive strontium, caesium, europium, plutonium, and americium. The area was cordoned off as the “Chernobyl Exclusion Zone” (CEZ) but otherwise only lightly managed. Since then, research has obtained much information on the behavior and effects of the radiation on the forests, as well as the effects of light fires on the radiation and on people. The radioactive material moves throughout the trees and soil, with relatively little leaching to the ground water as long as the living plants and soil structure are present to recycle the materials. There is some health danger to forest workers from inhaling the dust; any harvested timber needs to be utilized with precautions, and collection of mushrooms and other edible plants are considered dangerous. Since the accident, relatively little attention has been paid to the forests. The fire detection and fighting equipment is quite old, access roads have not been well maintained, and the forests have become very crowded and infested with bark beetles—and thus more susceptible to wildfires.

Some small fires have occurred within the area; and a serious concern is the probability of a catastrophic wildfire such as those that have occurred in the western United States. Such large fires can very rapidly burn (and volatilize elements in) much of the organic matter, create their own weather pattern, and move radioactive smoke for hundreds of miles in whatever direction the wind may blow. Once begun, these fires are almost impossible to control except by a change to favorable weather.

Unless managed, forests in the CEZ are naturally susceptible to wildfires because of the species, soils, and weather patterns. Analyses involving computer simulation show that the forests have become even more susceptible to wildfires because of their crowded condition—similar to the forests in the western United States. The analyses further show that proper tending that reduces the crowding dramatically reduces both the fire susceptibility and the intensity of any fire that does start. The lower intensity means that the fires could be readily controlled. The tending could be done with equipment that does not jeopardize the health and safety of the forest workers.

Three coordinated systems are proposed to reduce the catastrophic wildfire danger: a fire monitoring system, a fire fighting system including open access roads, and a system to thin and otherwise manage the forests. An estimated annual cost of US\$ 20 million is needed to make the forests safe from catastrophic wildfires. These costs include modern monitoring sensors, modern fire fighting equipment, activities to make the forest more accessible, and machines to thin the forest to reduce the fire susceptibility and intensity.

It was later realized that the actual health impacts of a catastrophic fire had not been analyzed. A new analysis was then done to assess the effects of radiation from a catastrophic wildfire in the CEZ. Preliminary results of this analysis will be presented later in this conference by Dr. Aaron Hohl. As Dr. Hohl will show, preliminary results suggest that a catastrophic

radioactive wildfire will not cause cataclysmic results. It does assume that plant crops directly exposed to the radioactive smoke would not be consumed, among other things.

The analyses will be further checked and then sent to respected scientists throughout the world for peer review. Our intent is that both the analysis and the peer reviews will be published for public dissemination.

An analysis of the public reaction in terms of panic and stress from the radioactive smoke; economic loss from destroyed crops and tainted reputation of Ukraine's agriculture products; economic loss from reluctance to invest in Kiev; social loss from people in Ukraine being considered genetically compromised; and the cumulative stress of this radiation and other stresses were not analyzed. Additionally, an economic analysis was not done to determine the cost/benefit of active management to avoid the catastrophic forest fires.

The analyses and airing of the radioactive fire issue was initiated by an "ad hoc" group of scientists, including Rector Dmytro Melnychuk and Dr. Sergiy Zibtsev of National University of Life and Environmental Sciences of Ukraine (NULESU), myself from the Yale University, and Dr. Johann Goldammer of The Global Fire Monitoring Center, Freiburg University/United Nations University. We took the initiative because no one else recognized the catastrophic wildfire potential of the forests. Other scientists from around the world freely joined the effort, giving constructive advice and time for the analyses. Throughout the process, our goal has been to bring attention to responsible administrative officials so the issue could be addressed. To that end, we held conferences in July 26-27, 2007 and October 6, 2008 and held other individual meetings with other leaders and administrators. A total of 17 different countries, international governments, and ENGO's were contacted. Early in the process, it was decided that the concern should not be made public because of the concern for arson and other terrorism.

The first lesson learned is that the scientific and technical capacity and cooperation exists to analyze and solve the issue in a cooperative manner. The initial scientists were joined by many volunteers who together and simultaneously analyzed the effects and tried to turn the issue over to the various international bodies, NGO's, and national governments. In all there was technical cooperation from over six countries and many institutions. The international group of scientists and other technical people had little direct obligation and authority. Many scientists were not funded. A private foundation, the Chopivsky Family Foundation, funded much of the science and meetings, with the NULESU, the Ukraine government, and Yale University funding other parts. The specialists worked in several languages and shared ideas and information constructively across three continents and two languages. When, in the middle of the issue, we realized that another analysis—the effect of the radioactive smoke on human health—was needed, there was no hesitation to do this even though it might alter our previous position.

On the other hand, the administrative capacity to address such an international issue is sadly lacking. Even before further analyses showed the danger was less dramatic than originally thought, the many countries, ENGO's, and international governments acknowledged the danger but generally avoided becoming involved—despite many efforts in group and private meetings. Now, two years since the first meeting the forest is still untended; and this conference is being held to obtain administrative accountability by someone before the fire does occur.

There is a need for these bodies to accept responsibility and at least inform the people of the level of danger. And, the "precautionary principle" and the "compassion principle" call for something to be done. The current lack of accountability—especially at the international and NGO level—can undermine the public respect for efforts to deal with other global hazards before they become disasters.



Figure 1. The crowded pine stands on sandy soils in the Chernobyl Exclusion Zone make the area highly susceptible to a catastrophic wildfire.



Figure 2. Thinning crowded stands makes them much less susceptible to a catastrophic wildfire. (Photo from Yakama Indian Reservation, Washington, U.S.A.)

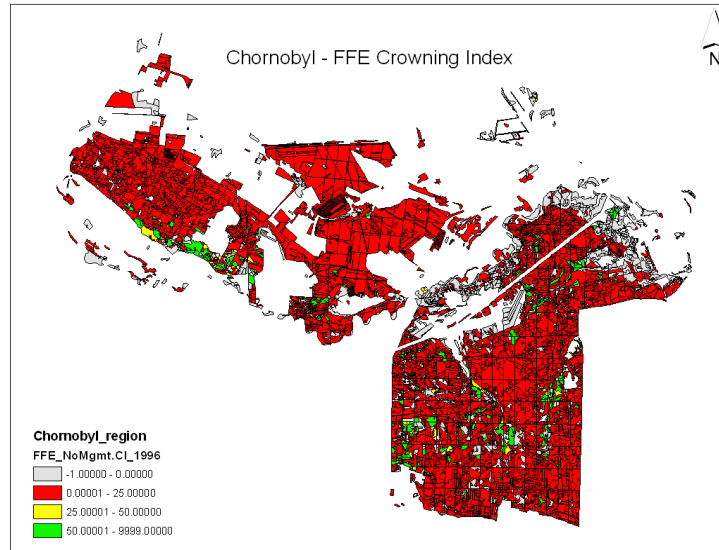


Figure 3. FFE Fire Risk Map using Crowning Index for 1996 with No Management. Classes are High (0-25), Moderate (25-50) and Low (50+).

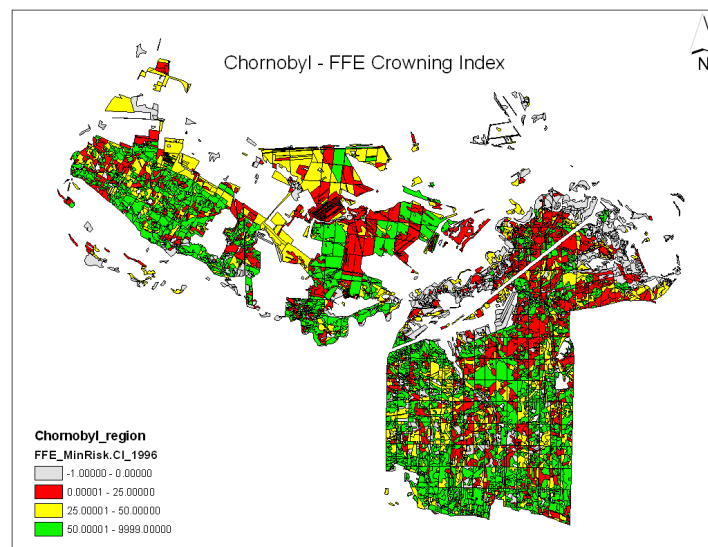


Figure 4. FFE Fire Risk Map using Crowning Index in 1996 with Management to reduce fire risk.



Figure 5. Technical equipment such as this can enable the irradiated forests to be managed with minimal exposure of the workers to radiation.