



China's new forest policy, the Natural Forest Conservation Program, is discussed with respect to several issues, including land ownership, democratic support for the program, and forest management approaches being used. The popular media is often criticized for reporting about scientific findings without adequately evaluating the quality of evidence; "[h]owever, many scientists themselves do not have a working grasp of defensible scientific method." And the features of complex oxides that are candidates for plutonium immobilization are examined.

China's New Forest Policy

In response to the ecological failure of recent forest policies, China has introduced a new policy called the Natural Forest Conservation Program (NFCP), which Zhang *et al.* discuss in their Policy Forum "China's forest policy for the 21st century" (*Science's Compass*, 23 June, p. 2135). The NFCP focuses on natural forests and affects more than two-thirds of the land area of China; therefore, its success is critical not only to China's forestry and economy, but also to Chinese culture and the global environment.

Although the NFCP may temporarily mitigate ecological degradations in proposed areas, there appear to be some flaws in this new policy. First, the reform of land ownership is absent from the NFCP. Currently, the Chinese government owns most of the land and authorizes its use by the local people. This separation of land ownership and use has created the "tragedy of the commons" in China's recent forestry history (1). If this problem is not addressed, the current efforts and investments by the central government to save the nation's natural forests will inevitably induce the next disaster when the reforested areas produce economic benefits in a few decades.

Second, the decision-making process and implementation of the NFCP lacks democratic support from the people in the affected areas (2). The new policy has a "broad brush" approach that does not take into consideration the heterogeneity of nature, society, economy, and culture. Education and communication with the local people should be a top priority of the NFCP.

Third, the new policy does not use the best scientific approach to forest management; namely, ecosystem management, which emphasizes sustainability, biodiversity, ecosystem functionality and integrity, and human interaction with the ecosystem. The NFCP focuses more on protection (natural restoration) than on management; the concept of ecosystem management is never mentioned. Local knowledge is also

important in managing forest ecosystems, but is neglected in the new policy.

Finally, the NFCP does not take into account the long-term social and cultural impacts, but is based solely on ecological and economic considerations. Relocating forest dwellers in the remote areas may provoke social conflicts and increase the loss of cultural diversity because most people living in the remote forest areas are minorities. Geographic separation has preserved their cultures for thousands of years, and moving them out of the forests to urban areas will result in cultural assimilation. These issues must be addressed before the NFCP can have relevance to other countries, particularly developing countries.

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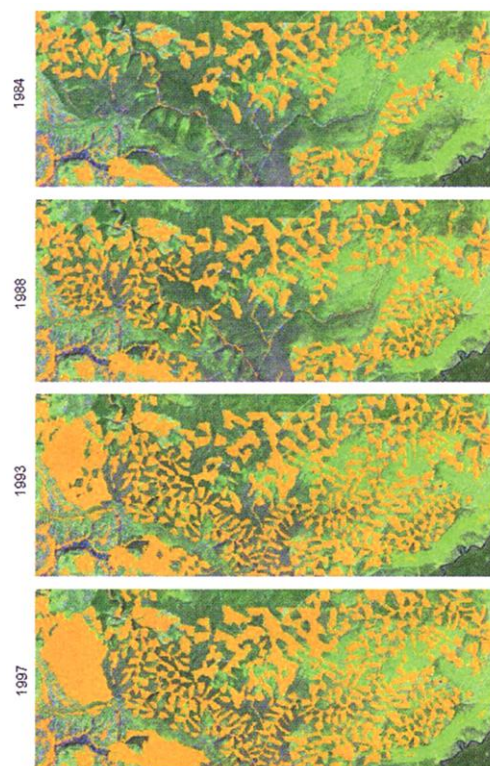
Response

We agree with the importance of the four factors that Xu, Qi, and Gong discuss, but we take a broader view than they present of China's forestry and the new policy. Xu and colleagues draw attention away from the primary targets the NFCP is intended to address. In the last 20 years, excessive logging and poor implementation of the old forest policy have led to a dire situation (1), illustrated by a study site located outside of Changbai Mountain Reserve, Jilin Province, in northeast China (see the figure). Here the cutting fields constantly exceeded the legally allowed 5-hectare limit, the subsequent cuttings were only a few years apart, and the remaining forests were so thin that cleared fields connected and dominated the landscape matrix. The result was fragmentation that occurred at unprecedented rates.

It has been recognized that a strong po-

litical and economic commitments from the top levels of government are needed to rapidly reverse deforestation such as that seen in Jilin Province and ensure an improvement in ecological conditions (2). NFCP is the first such program, and the value and substance of the NFCP would be lost if its role in protecting natural forests, the core component in China's forestry, were diminished.

Regarding the issues raised by Xu *et al.*, we disagree that the separation of land ownership and use will induce another disaster. Natural forests can be effectively protected from fragmentation if land ownership is separated from use. Because more than 80% of natural forests is owned by the government (1), turning over ownership to local foresters would likely lead to partial removal of natural forests because of the foresters' economic difficul-



Landsat Thematic Mapper images of a 22- by 9-kilometer site in Jilin Province show progressive clear-cuttings in leaflet patterns, with an average cutting area of 15 hectares (orange represents cutting fields) (3).

ties and lack of recognition of ecological values of the forests. Lessons learned in the past drove the government to search for a better approach for redistributing land tenure. The mandatory conversion and share in private ownership programs outlined in the NFCP were determined to be the most practical measures to combat deforestation while encompassing the land ownership issue.

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SCIENCE'S COMPASS

Xu *et al.* contend that there is little democratic support for the NFCP from the people in the affected areas; however, we see the opposite. Development of the NFCP started in 1996 with the active involvement of forestry professionals, scholars, and local communities. It took 2 years for the central government to formulate the new forest policy. Forestry units from almost all provinces applied to participate in the NFCP. During implementation, the technical training and education program we discussed in our Policy Forum has been offering opportunities to hundreds and thousands of forestry professionals, non-professionals, and farmers to acquire government support and guidance and to negotiate with the policy practitioners.

Regarding the criticism that the NFCP does not incorporate current forest management approaches, ecosystem management and biodiversity principles have indeed been incorporated into classifying forest regions, prioritizing NFCP zones, and developing the new policy since it began. Only when the remaining natural forests are successfully protected can ecosystem management become practically meaningful. The central government has assigned one of the three major research sites we mentioned, Baihe Forestry Bureau in Jilin province, as a test site where forest cutting and regeneration for maintaining ecosystem sustainability are being studied. Certainly, as the policy is implemented and the trend in deforestation reversed, more sophisticated practices of ecosystem management will be specified for the next stage.

And as for the social and cultural impacts of relocating forest dwellers, extensive forest exploitation did not occur until the 1950s, when the government started to move thousands of people to forested areas. The native culture in forested areas has been severely affected along with forest. Relocating foresters who are non-natives is the only way to control human populations in forested areas and restore native culture and biodiversity. Educational and financial support provided by the government should adequately minimize the chances of major social conflicts during resettlement operation.

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2. See information available at <http://www.iisd.ca/forestry/forest.html>
3. G. Shao and G. Zhao, in preparation.

Acceptable Evidence

Boyce Rensberger in his Essay "The nature of evidence" (*Science's Compass*, 7 July, p. 61) makes a solid and hopeful case for improvements in science exposition in the popular media—particularly in regard to the training of journalists in what constitutes acceptable evidence from a scientific perspective. Certainly, much of the media could only benefit from such exposure; it is alarmingly common to see an utter suspension of evidentiary rules when reporting on extraordinary and often anecdotal hypotheses such as divining for water or therapeutic touch. The public is not well served by journalism that does not aggressively evaluate the quality of the evidence behind such claims.

Rensberger suggests that scientists make a greater effort to explain their methods to the press. However, many scientists themselves do not have a working grasp of defensible scientific method. Decades of mandatory instruction in statistics and experimental design to undergraduates and graduates in the life sciences have left multitudes of students, and not a few faculty, who still seek mostly confirmatory rather than contradictory evidence, who can't understand the concept of sampling distributions and hence do not understand the risks of small samples or lack of independent replication, who don't understand the most basic rules of probability that can severely affect the interpretation of evidence (such as independence or correlation of observations), and who have never grasped the concept of null distributions or that powerful tool of all skeptics—all data sets can be "explained" by multiple hypotheses. All over the country, life-science departments spend enormous effort teaching their students "things" rather than teaching them how to do science.

This critical deficiency in scientific training leads to the problem that Joshua Lederberg described in comments relating to scientific fraud: "The promulgation of fraud is an outrage, striking at the moral roots of the scientific enterprise. But its moral stridency is large, I submit, compared to its practical importance in most scientific fields. A much larger toll is exacted from inadequate experimental design and sloppy execution. The lost effort that is expended in straightening out muddy claims, or merely in plowing through their presentation in the literature, greatly exceeds what can be attributed to intentional fraud" (*J*, p. 13).

If anything, the situation Lederberg de-