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## LETTERS

edited by Jennifer Sills

### Unlocking the Door to Better Cybersecurity



IN THEIR PERSPECTIVE (“REFLECTIONS ON CYBERSECURITY,” 13 November 2009, p. 943), W. A. Wulf and A. K. Jones claim that the perimeter defense model does not work. I agree with them that a perimeter has limitations. However, just as a lock on a front door is useful even though it can be broken, perimeters provide good, albeit imperfect, protection.

Wulf and Jones propose an alternative approach in which a minimal mechanism enables multiple end-to-end security protocols. However, the reliance of the security of a communication solely on the end-to-end security protocols is dangerous, because if the protocols were to be broken, the communication would also be broken. The Transport Layer Security (TLS) protocol is one such example; it has been used for over a decade but was just recently discovered to have security flaws, permitting an attacker to inject data in an

authenticated session (1). Using multiple security protocols leads to the same problem. Moreover, using the public key for all objects in cyberspace is practically infeasible. Finally, cyber attacks include denial of service, and prevention of this type of attack is still very difficult, irrespective of how secure the end-to-end protocols are.

I believe that to ensure security in the cyberspace, multiple mechanisms should be used, including perimeter defense, intrusion detection, and application-defined security. This concept is analogous to a treasury with a locked gate, surveillance equipment, and a guard who can identify authorized persons.

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#### Reference

1. U.S. Department of Homeland Security, United States Computer Emergency Readiness Team, Vulnerability Note VU#120541, “SSL and TLS protocols renegotiation vulnerability” ([www.kb.cert.org/vuls/id/120541](http://www.kb.cert.org/vuls/id/120541)).

#### Response

WE COMPLETELY AGREE THAT MULTIPLE MECHANISMS should be used to ensure security; we would only go further to say that we should not force everyone to use the same multiple mechanisms. The essence of our proposal is that what should be “built in” to the Internet is a mechanism to allow user-defined end-to-end security protocols.

Our approach allows the use of perimeter defense, but also allows other approaches to be used if they are desired. It also allows for creating security appropriate to applications not currently envisioned. Finally, it permits multiple implementations of the same secu-

rity policy so that if there is a bug in one of the implementations, it doesn’t open the door to all systems.

By all means, if you want a lock on your door, have one. Have three if that makes you feel better. But your town isn’t secure if all the locks open to the same master key! Having a single implementation of a single security policy has precisely this vulnerability.

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ence campus, which had suffered substantial damage. Several walls were down, and people were using shovels and wheelbarrows to carry rubble out of buildings. There was neither water nor electricity, and an eerie atmosphere enveloped the campus.

As we walked by the animal facility, we saw water seeping below the door. We used a flashlight to find our way through ankle-deep water to locate the source of the flooding: a broken pipe with water pouring out. After some effort, we managed to stop the water.

The last major earthquake in Chile was in 1985. Maria Rosa experienced that event firsthand and learned lifelong lessons about lab preservation as a result. In her lab, all the solvents were stored in rigid plastic boxes on the floor and shelves were screwed to the walls. For 25 years, she has told her students to push the microscope against the wall at the end of the day. Generations of students probably felt this was a useless precaution, but not today.

The scientists I spoke to in the immediate aftermath of this earthquake were universally calm and determined in the face of daunting setbacks. If there is anything positive to take away from this earthquake, it is renewed

### Chilean Scientists Rally After Quake

SCIENTISTS, AS OTHERS IN CHILE, WERE HIT HARD by the 27 February earthquake. Two days after the earthquake, I traveled to Santiago and visited the University of Chile (Universidad de Chile), one of the two largest state universities in Chile. My friend and collaborator Maria Rosa Bono gave me a tour of the sci-

#### Letters to the Editor

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appreciation of our courageous Chilean colleagues as they move forward to confront these challenges.

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## Salmon Swimming Against Multiple Threats

THE NEWS FOCUS STORY, "FISHING FOR GOLD IN the last frontier state" (S. Kean, 15 January, p. 263) highlights the importance of habitat and the qualities of landscape, whether marine or terrestrial, to protecting diversity and abundance of animals, in this case the salmon of Bristol Bay and the adjacent watersheds.

The News story discusses mining but does not mention the many other threats to this ecosystem. Bristol Bay is scheduled for oil and gas exploration in the near future; large tanker traffic passing through Unimak Pass and the edge of Bristol Bay is increasing (1); and industrial fishing in the Bering Sea with high rates of bycatch is common (2). We should be asking not what mining will do to Bristol Bay salmon, but whether mining in

the Bristol Bay watershed will be the straw that breaks the salmon's back.

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### References

1. Transportation Research Board of the National Academies, "Risk of vessel accidents and spills in the Aleutian Islands: Designing a comprehensive risk assessment" (Special Report 293, 2008).
2. V. Morell, *Science* **326**, 1340 (2009).

## Planning for Biodiversity in Future Climates

O. VENTER *ET AL.* ("HARNESSING CARBON PAYMENTS to protect biodiversity," *Brevia*, 4 December 2009, p. 1368) demonstrate that careful targeting of reduced emissions from deforestation and degradation (REDD) funds can double biodiversity benefits while incurring only a small reduction (4 to 8%) in carbon benefits. However, they do not address whether this win-win solution would still be tenable if objectives were extended to include protection of biodiversity under future climates.

Tropical species are already shifting their distributions in response to increasing mod-

ern temperatures (1, 2). Thus, forests that are important to biodiversity now will not necessarily be so in the future (3). This complicates any assessment of the longer-term biodiversity value of carbon-rich forests at finer scales.

Funding allocations that simultaneously address protection of biodiversity under current and future climates will ultimately be more effective and less costly (4). Analytical tools are available to identify areas important for future conservation (e.g., migration corridors and refuges) (4–6). Application of these tools should be rapidly expanded across the global tropics to inform within-country allocation of REDD funds.

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### References

1. I.-C. Chen *et al.*, *Proc. Natl. Acad. Sci. U.S.A.* **106**, 1479 (2009).
2. A. J. Pounds, M. P. L. Fogden, J. H. Campbell, *Nature* **398**, 611 (1999).
3. M. B. Araújo, M. Cabeza, W. Thuiller, L. Hannah, P. H. Williams, *Global Change Biol.* **10**, 1618 (2004).
4. L. Hannah *et al.*, *Frontiers Ecol. Environ.* **5**, 131 (2007).
5. S. L. Phillips, P. Williams, G. Midgley, A. Archer, *Ecol. Appl.* **18**, 1200 (2008).
6. T. J. Killeen, M. Douglas, T. Consiglio, P. M. Jørgensen, J. Mejia, *J. Biogeogr.* **34**, 1357 (2007).

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## Response

SHOO QUESTIONS WHETHER AREAS WE IDENTIFY as global priorities for reducing expected carbon emissions and species extinctions—such as Madagascar, Indonesia, and the Philippines—will still sustain high levels of biodiversity after a century of climate change.

We believe that present centers of tropical endemism and diversity are, broadly speaking, likely to remain important in the future. Such centers tend to occur in regions that have remained climatically stable over long periods, such as hyper-wet, cloudy areas in the Andes that have withstood Pleistocene climatic fluctuations (1). Moreover, temperature is predicted to shift at a global average velocity of 0.42 km per year, or 42 km this century (2), whereas our scheme focuses on developing countries that average more than 700,000 km<sup>2</sup> in area. Hence, the large scale of our analysis relative to the pace of climate change makes it doubtful that priorities will shift much this century.

Although we agree that climate-induced shifts in species' ranges could theoretically be incorporated into our work and conservation planning more broadly, such efforts are

plagued by a dearth of data, methodological shortcomings, and uncertainty (3, 4). The choice of modeling approach, in particular, can strongly affect one's results. For instance, nine different bioclimatic models yielded wildly varying predictions of future range size for a South American plant species, ranging from a loss of 92% to a gain of 322% (5). Hence, we stand by our priority areas for using REDD to protect both forest carbon stocks and biodiversity. Shoo raises an interesting point, but not one that is likely to be of practical relevance now, when forests are under siege and conservation planners must make immediate decisions.

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### References

1. J. Fjeldsa, E. Lambin, B. Mertens, *Ecography* **22**, 63 (1999).
2. S. R. Loarie *et al.*, *Nature* **462**, 1052 (2009).
3. C. F. Dormann, *Basic Appl. Ecol.* **8**, 387 (2007).
4. M. B. Araújo, C. Rahbek, *Science* **313**, 1396 (2006).
5. R. G. Pearson *et al.*, *J Biogeogr.* **33**, 1704 (2006).

## Is the Message from Athens Being Heard?

IN THEIR 2009 POLICY FORUM (1), B. WALKER *et al.* called for greater interaction among existing institutions to tackle global-scale challenges. In April 2009, leading scientists, politicians, economists, and academics, as well as representatives from European Union Member States, civil society, and business put forward the Message from Athens (2): eight key priorities in EU biodiversity policy. Key priority 7 emphasizes the need for integration of the EU nature directives into other policy areas such as agriculture and regional development. The EU directives are an excellent example of the kind of cooperation that Walker *et al.* were calling for. However, it appears that the message is not being heard by the public at large nor by some leaders.

Natura 2000 is the European Union's main policy instrument to address the loss of biodiversity (3). It is a network of nature protection areas established under the 1992 Habitats Directive and 1979 Birds Directive. Most of the protected land is expected to continue to be privately owned, and ecologically and economically sustainable development is a goal.

In Western Europe, planned dredging of the Scheldt River estuary in the Netherlands for the benefit of Antwerp harbor in Belgium puts at risk surrounding foraging and breeding grounds for birds protected under EU legislation. Under the Directives, loss of these Natura 2000 sites requires compensation measures, such as restoration of tidal mudflats. This implies flooding of Dutch agricultural polder land. Debate about the conflicting issues of bird protection and food production has begun to surface in the Dutch press [e.g., (4)]. The situation is also being seen as a conflict between a distant EU interest and local sacrifice (4). The resigning Dutch Prime Minister Jan-Peter Balkenende stated, in an attempt to weaken the EU nature directives (5), that “Natura 2000... overshoots the mark” and that public support for nature and biodiversity policy in the Netherlands (an EU member state) was diminishing. José Manuel Barroso (President of the EU Commission) replied to the Dutch leader that a review of the directives would not be justified because “economic operators benefit from a stable and predictable legislative framework” and “the inevitable legal uncertainty that would be caused by a review would be likely to slow

down the development of existing plans and projects” (5).

The EU nature directives are supranational and enforceable, working toward a global view on issues that transcend local priorities. Unfortunately, these efforts are misunderstood, unappreciated, or feared, and the economic crisis offers further incentives to brush them aside. However, this directive tool is unique in an international context, as it overrides local interests when global issues are at stake. The EU nature directives strive to integrate conservation with human activity, wherever needed, and a confrontation should not be necessary. Although the strength of the directive tool is clear, the Message from Athens has apparently not been communicated effectively, not even to a political leader in a member state, and the European Union must think hard about how to bridge the divide.

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## References

1. B. Walker *et al.*, *Science* **325**, 1345 (2009).
2. European Commission, “The Message from Athens” (2009); [http://ec.europa.eu/environment/nature/biodiversity/conference/index\\_en.htm](http://ec.europa.eu/environment/nature/biodiversity/conference/index_en.htm).
3. European Commission, Natura 2000 Network; [http://ec.europa.eu/environment/nature/natura2000/index\\_en.htm](http://ec.europa.eu/environment/nature/natura2000/index_en.htm).
4. L. O. Fresco, “Het ontpolderingsmodel,” *NRC Handelsblad*, 13 October 2009.
5. C. Janssen, M. van Lieshout, “Balkenende wilde EU-natuurwet afzwakken,” *Volkskrant*, 8 January 2010; [www.volkskrant.nl/binnenland/article1335678.ece/Balkenende\\_wilde\\_EU-natuurwet\\_afzwakken](http://www.volkskrant.nl/binnenland/article1335678.ece/Balkenende_wilde_EU-natuurwet_afzwakken).

## CORRECTIONS AND CLARIFICATIONS

**Reports:** “Deletion of Atoh1 disrupts Sonic Hedgehog signaling in the developing cerebellum and prevents medulloblastoma” by A. Flora *et al.* (4 December 2009, p. 1424). Reference 3 should instead cite: M. C. Thompson *et al.*, *J. Clin. Oncol.* **24**, 1924 (2006).

**News Focus:** “Sex and social structure” by E. Pennisi (23 October 2009, p. 518). Mary Jane West-Eberhard should have been listed as affiliated with the Smithsonian Tropical Research Institute in Panama.

**Research Articles:** “Macrovertebrate paleontology and the pliocene habitat of *Ardipithecus ramidus*” by T. D. White *et al.* (2 October 2009, p. 67). The beginning of the description of panel (C) in the Fig. 1 caption on p. 88 should read, “(C) Total NISP. The NISP value reflects all collected specimens identified to taxon and excludes bulk specimens. Associated dental...”