Mining and conservation: implications for Madagascar's littoral forests

James E.M. Watson, Liana N. Joseph, & Richard A. Fuller

The University of Queensland, The Ecology Centre, Queensland 4072, Australia

Keywords
Mining; Madagascar; littoral forests; conservation; biodiversity.

Correspondence
James E.M. Watson, The University of Queensland, The Ecology Centre, Queensland 4072, Australia.
Tel: +61-7-3365-2454;
fax: +61-7-3365-1655. E-mail: james.jameswatson@gmail.com

Received
12 October 2009
Accepted
28 February 2010

Editor
Ana Rodrigues

doi: 10.1111/j.1755-263X.2010.00124.x

A recent article in *Conservation Letters* by Virah-Sawmy (2009) presents new evidence with the potential to change conservation planning in Madagascar. However, it ends with unsubstantiated policy recommendations that, if followed, could accelerate clearance of the few remaining patches of littoral forest in south-eastern Madagascar, one of the most threatened ecosystems on the island. The principal threat to littoral forests in south-eastern Madagascar is mining. One justification for the conversion of remaining littoral forests for mining has been that these forests have been heavily cleared since prehistoric times and will therefore be lost anyway in the near future (QIT Madagascar Minerals 2001). Using paleo-ecological data, Virah-Sawmy convincingly shows that this justification is not scientifically supported as the patchy distribution of littoral forest is best explained by soil moisture rather than the actions of past human activities. In fact, it is only in the past three decades that large-scale deforestation has occurred in some stands of littoral forest, and this has been associated with the mining venture (Ingram & Dawson 2006).

In a surprising set of policy recommendations, Virah-Sawmy does not call for the cessation (or reassessment) of mining activity in the threatened littoral forest ecosystems, but contends that "Based on our analysis, we suggest that if the appropriate conditions and measures are put in place for restoration ... the littoral forest may once again expand and regenerate after the degradation it suffered in the last few decades ...."

These recommendations are highly problematic for two reasons. First, with about 6,000 ha (80% of the littoral forest in the region) subject to planned clearance over the next 50 years (Vincelette *et al*. 2003), it seems obvious to us that conservation policy must focus foremost on reducing the areal extent of habitat loss.

Second, Virah-Sawmy did not investigate the appropriateness of offsetting or restoration activity, so her claim that littoral forests can be restored "if appropriate conditions and measures" are taken, is simply unsubstantiated. In fact, littoral forest plants grow more slowly in demineralized soils in comparison with normal soils and grow poorly away from standing forest fragments (Vincelette

et al. 2007). Moreover, the size of the proposed conservation zone currently planned (three patches protected with a total size of 970 ha; Vincelette *et al*. 2003) is dwarfed by the amount of habitat about to be lost, so does not "compensate for residual, unavoidable harm to biodiversity" in Virah-Sawmy's own words. This level of reservation is inadequate for the persistence of littoral forest bird and mammal communities and for key ecological functions such as seed dispersal (e.g., Ramanamanjato & Ganzhorn 2001; Bollen *et al*. 2004; Watson *et al*. 2004, 2005, 2009).

Although we believe that Virah-Sawmy has provided a valuable historical perspective on forest patchiness in southeastern Madagascar, mining is a serious imminent threat to endangered littoral forest ecosystems, and it is imperative that conservation policy recommendations do not unintentionally condone proposed habitat destruction by treating it as a fait accompli.

References

Bollen, A., Elsacker L., Ganzhorn J. (2004) Tree dispersal strategies in the littoral forest of Sainte Luce (SE-Madagascar). *Oecologia* **139**, 604–616.

Ingram, J.C., Dawson T. (2006) Forest cover, condition, and ecology in human-impacted forests, South-Eastern Madagascar. *Conserv Soc* **4**, 194–230.

QIT Madagascar Minerals. (2001) *Social and environmental impact assessment*. QIT Madagascar Minerals South Africa (QMM S.A.), Montreal, Canada.

Ramanamanjato, J.-B., Ganzhorn J.U. (2001) Effects of forest fragmentation, introduced *Rattus rattus* and the role of exotic tree plantations and secondary vegetation for the conservation of an endemic rodent and a small lemur in littoral forests of southeastern Madagascar. *Anim Conserv* **4**, 175–183.

Vincelette, M., Rabenantoandro J., Randrihasipara L., Randriatafika F., Ganzhorn J.U. (2007) Results from ten years of restoration experiments in the southeastern littoral forests of Madagascar. Pages 337–354 in J.U. Ganzhorn, S.M. Goodman, M. Vincelette, editors. *Biodiversity, ecology and conservation of littoral ecosystems in southeastern Madagascar, Tolagnaro (Fort Dauphin)*. Smithsonian Institution, Washington, DC.

Vincelette, M., Randrihasipara L., Ramanamanjato J.B., Lowry P.P., Ganzhorn J.U. (2003) Mining and environmental conservation: the case of QIT Madagascar Minerals in the southeast. Pages 1535–1537 in S.M. Goodman, J.P. Benstead, editors. *The natural history of Madagascar*. The University of Chicago Press, Chicago.

Virah-Sawmy, M. (2009). Ecosystem management in Madagascar during global change. *Conserv Lett* **2**, 163–170.

Watson, J.E.M., Whittaker R.J., Dawson T.P. (2004) Avifaunal responses to habitat fragmentation in the threatened littoral forests of south-eastern Madagascar. *J Biogeogr* **31**, 1791–1807.

Watson, J.E.M., Whittaker R.J., Dawson T.P. (2005) The importance of littoral forest remnants for indigenous bird conservation in southeastern Madagascar. *Biodivers Conserv* **14**, 523–545.

Watson, J.E.M., Watson A.W.T., Fischer J., Ingram J.C., Whittaker R.J. (2009) Using nestedness and species-accumulation analyses to strengthen a conservation plan for littoral forest birds in south-eastern Madagascar. *Int J Biodivers Conserv* **1**, 67–80.

