# 6.3 Biodiversity in burned concession areas

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## What should be done?

Even the best managed tropical forests may be vulnerable to fire after major droughts. What are the implications for biodiversity conservation values? Should management allow burned forest areas to remain within a certified timber operation?

In 1997–98 large tracts of forest were burned in eastern Borneo, including many logging concession areas. The Indonesian government's initial reaction was to allow dead trees to be harvested from the burned concession area. This salvage logging was done with heavy machinery and caused a lot of additional damage to the burned forests (van Nieuwstadt, Sheil and Kartawinata 2001).

Management actions such as salvage logging — which further degrade burned forests after fires — can make regeneration of the burned forest extremely difficult.

Recent insights from the area show that most tree species are still present in the burned forest matrix, even after repeated fires (van Nieuwstadt 2002; Slik, Verburg and Kessler 2002; Slik and Eichhorn 2003; Eichhorn 2006; Slik et al. 2008). This means that these forests are still valuable as biodiversity storehouses. In addition, fire damage mainly affected small-diameter trees, indicating that the fire acted as a large-scale thinning process that might actually stimulate the growth of surviving harvestable stock, even though it is likely that many large trees suffered bark damage that might eventually lead to rot of stem heartwood. The research also showed that due to the mast fruiting[1] of most Asian tree species and the almost complete elimination of the forest understorey by fire, re-establishment of old-growth forest species in burned forests is slow. Initial recovery of a closed canopy depended almost entirely on the quick establishment of pioneer tree species.

There was no major mast flowering-fruiting in Borneo in the first seven years after the 1997–98 fires. The regeneration of old-growth tree species during this period depended almost completely on resprouting and seeds produced by surviving trees in the burned

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forest, with no significant contribution from the neighbouring unburned forest. Management actions such as salvage logging — which further degrade burned forests after fires — can make regeneration of the burned forest extremely difficult.

Current codes of practice and certification standards make no clear stipulations about what should happen to burned areas of high forest. This makes it hard for managers to know what is required of them. If fires occur in a certified concession there is likely to be much discussion concerning what should be done next.

## Conclusions

Before we set clear standards we should recognize the principles of good biodiversity-preserving practice:

1. Good practice needs to be defined for areas of forest that have been affected by fires and similar events (e.g., hurricanes).
2. The initial phase of recovery in burned forest depends almost entirely on tree sprouting and seed rain from surviving trees within the burned forest, so if salvage logging is undertaken extreme care has to be taken to reduce damage to the forest understorey. This can be done by minimizing skidding activity or by planning skid trails to avoid forest patches with a large number of climax species. On–site harvesting and processing of dead trees (by means of chainsaw milling or mobile milling) may be another option.
3. Since burned forests are slow to recover, it is recommended that they be closed to logging for a period of 35 years (or whatever the local logging interval is).
4. Efforts must be made to prevent further fires; burned forests have an increased risk of catching fire again (Cochrane 2003).

## Endnote

1. Mast fruiting is the synchronized production of large seed crops by certain tree species.

## References

Cochrane, M.A. 2003. "Fire science for rainforests." *Nature* 421: 913–919.

Eichhorn, K.A.O. 2006. "Plant diversity after rain forest fires in Borneo." *Blumea Supplement* 18: 1–140.

Slik, J.W.F., C. Bernard, M. van Beek, F.C. Breman and K.A.O. Eichhorn. 2008. "Tree diversity, composition, forest structure and aboveground biomass dynamics after single and repeated fire in a Bornean rain forest." *Oecologia* 158: 579–588.

Slik, J.W.F. and K.A.O. Eichhorn. 2003. "Fire survival of lowland tropical rain forest trees in relation to stem diameter and topographic position." *Oecologia* 137: 446–455.

Slik, J.W.F., R.W. Verburg and P.J.A. Kessler. 2002. "Effects of fire and selective logging on the tree species composition of lowland dipterocarp forest in East Kalimantan, Indonesia." *Biodiversity and Conservation* 11: 85–98.

van Nieuwstadt, M.G.L. 2002. *Trial by fire: postfire development of a tropical dipterocarp forest*. Thesis Utrecht University, the Netherlands.

van Nieuwstadt, M.G.L., D. Sheil and K. Kartawinata. 2001. "The ecological consequences of logging in the burned forests of East Kalimantan, Indonesia." *Conservation Biology* 15: 1183–1186.