The State of the Forests of Papua New Guinea

Mapping the extent and condition of forest cover and measuring the drivers of forest change in the period 1972-2002

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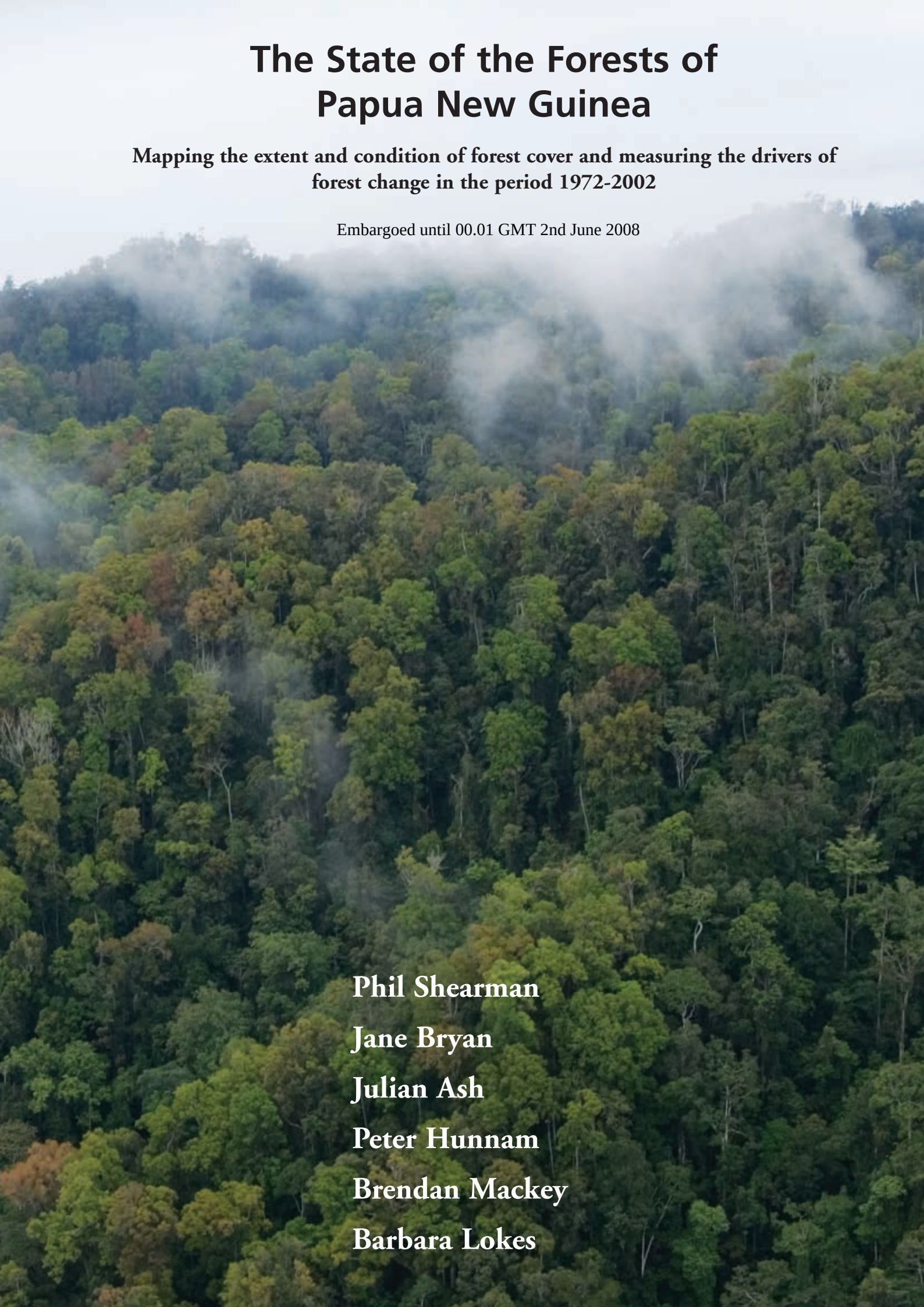

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Preface

Papua New Guinea is an island nation that sits just to the north of Australia at the junction of South East Asia and the Pacific Islands. Forests are the dominant feature of the country's ecology extending over 33 million hectares of rugged landscape to govern the flow of water and energy and all other ecosystem processes. An astounding diversity of plant and animal life has evolved in these forests; perhaps 6-7 % of the world's species in a land area less than half of one per cent of the world's total. This rich living resource provides the essential foundation for the lives, diverse cultures, livelihoods and economy of Papua New Guinea's peoples.

In order to exploit PNG's natural resources wisely and sustainably, to manage the economy and development of the nation, to protect ecological processes and conserve biological diversity, and to safeguard the cultures and livelihoods of six million Papua New Guineans, it is important to know the extent and condition of the national forest estate and the location and area of each forest type. It is also essential to measure changes that occur to the forest resources, and to understand and regulate the drivers of these changes.

To date, knowledge of Papua New Guinea's forests has been patchy and imprecise. Policy makers, forest managers and conservationists have not had comprehensive information to guide their efforts or to evaluate their decisions. This has often resulted in an inadequate and ineffectual regime of forest governance and management.

Previous attempts to estimate forest cover, condition and especially change have foundered on the difficulties of measuring fine-scale patterns of vegetation and localised change, which are made much more difficult by the rugged topography and persistent cloud cover that characterise PNG.

For the past five years, a small team at the University of Papua New Guinea has worked out solutions to these problems. They have developed techniques for the analysis of high-resolution satellite imagery, electronic pattern recognition software, and spatially accurate mapping, in order to resolve forest types, boundaries and change in closed forests at the precision of a few tens of metres. The techniques applied provide an accurate base for evaluating the current state of the forest landscape of PNG, and for measuring where change has occurred. Additional data sets have been analysed to determine the causes and rates of the documented changes.

This document presents a summary of the results of this research and provides positive prescriptions to improve the quality of future forest management policy.

The State of the Forests Study

Since 2003, the University of Papua New Guinea Remote Sensing Centre has prepared and analysed comprehensive data-sets on the state of the country's forests from the early 1970s, centred on 1972, and from the early 2000s, centred on 2002. This report presents its findings on the past and current extents of Papua New Guinea's intact forests, the rates of forest changes across Papua New Guinea over the period of the past thirty years, and discusses the causes and implications of these losses for the country's national forest estate. The report focuses on quantification of the gross changes that have occurred through the conversion of intact forest to degraded logged forest, garden and fallow land, grassland, plantation and other non-forest classes.

The present study is the first to analyse deforestation and degradation across the whole country at a scale and precision able to discern the effects of each of the major drivers of forest change. This required the development of techniques that are robust over the broad variety of terrain and vegetation and the frequent cloud cover that prevails in PNG. Analysis of changes to land cover presents many challenges, especially when the older baseline maps (1970s) and the new satellite imagery (2000s) are based on different types of information; the combination in PNG is perhaps unique and required the development and application of novel methods.

Deforestation and forest degradation can only be adequately quantified and monitored across a large geographical area using high-resolution satellite imagery. This requires the comparison of precisely located imagery showing appropriately classified vegetation types recorded at different times (Asner et al, 2005). This study mapped recent (2002) forest extent and degradation using high-resolution Landsat ETM+ and SPOT4 & SPOT 5 imagery. The resulting 2002 forest map was compared with a baseline high-resolution 1972 forest map allowing the measurement of the 30-year net area of deforestation and degradation across PNG. Various methods were employed to identify the individual causes of areas where forest change had occurred. These data were used to estimate recent net deforestation and degradation rates. The methods employed by this study are detailed in Annex 2.

The study distinguishes commercial logging, subsistence cultivation and burning as the major drivers of forest change across PNG over the past thirty years. The analysis determines accurately for the first time the impacts of subsistence agriculture and of logging activities on forest cover in each region and province. These data are essential for the rational planning and management of future land and forest use, food production, conservation and development in Papua New Guinea.

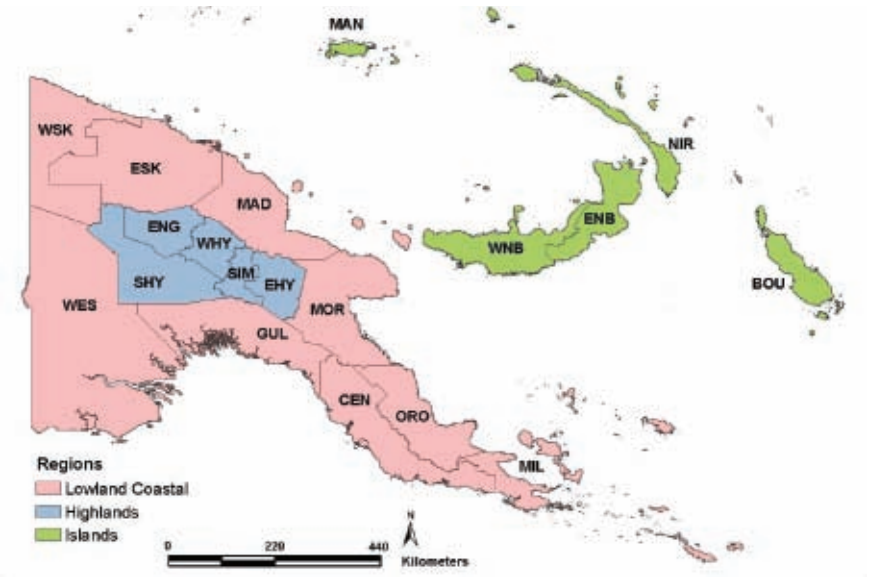

Figure 1: A map of Papua New Guinea showing provincial boundaries and general regions. Each province is shown coloured by the broad region in which it is situated, the Islands, the Highlands or the Mainland Lowland region. Provincial abbreviations: Bougainville (BOU); Central (CEN); Eastern Highlands (EHY); East New Britain (ENB); Enga (ENG); East Sepik (ESK); Gulf (GUL); Madang (MAD); Manus (MAN); Milne Bay (MIL); Morobe (MOR); New Ireland (NIR); Oro (ORO); Southern Highlands (SHY); Chimbu (SIM); Western (WES); Western Highlands (WHY); West New Britain (WNB); West Sepik (WSK).

Summary of Main Findings

The study of forest change across Papua New Guinea records that extensive and rapid deforestation and forest degradation have occurred over the thirty years from 1972 to 2002. The main human activities driving these changes are identified as commercial forestry, subsistence agriculture, fires, and the development and operations of mines and plantations.

The most significant findings of the study are as follows:

- Change in the extent and condition in PNG's forests is occurring considerably faster than previously recorded – it is estimated that in 2002, 1.41% of Papua New Guinea's tropical forests were being deforested or degraded annually.
- By 2002 primary forests accessible to mechanized logging were being degraded or cleared at the rate of 2.6% per annum. In 2001 approximately 362,400 hectares of these forests were deforested or degraded. Of the 1972 commercially accessible forest area, it is estimated that by 2021, 83% will have been cleared or degraded if current trends continue.
- Forests are being logged repeatedly and wastefully, with little regard for forest ecology, ecosystem functions or silvicultural practices which reduce impact and enhance regeneration. Across the Mainland lowland and Islands regions, logged forests have in many locations been reduced to a state that is highly vulnerable to further degradation and eventual conversion.
- The management of PNG's forestry industry has paid little attention to the concept of sustainability in planning forest management and accessing forest land, nor to measures to ensure low impacts, good silvicultural practices, biodiversity conservation, equitable access and sharing of benefits from resource exploitation.
- The area of PNG's globally important montane forests has been significantly reduced through burning, largely associated with fires occurring during periods of drought.
- Current conservation measures, through forest management practices or site or species protection, are inadequate. Neither the formal protected areas system (Wildlife Management Areas and National Parks), nor local efforts to combine conservation and resource-based development activities, supported by land-owners, conservation organisations and the national government's conservation agency, have safeguarded the forest resources they encompass.
- PNG forests could make a significant contribution to global efforts to combat climate change and it is in PNG's own interests to do so as the nation is particularly susceptible to its negative impacts. However, the current state of forest management and lack of effective governance means that PNG is a long way from being able to meaningfully participate in the carbon economy.
- This report concludes by advocating substantial reforms to PNG's forest and land management regime, stressing the urgent need for Papua New Guinea to strengthen natural resource governance, support for local landowners and community initiatives, sound silvicultural practices, biodiversity conservation and integrated catchment management, in order to achieve some degree of essential conservation, sustainability and security. Such changes will provide a framework in which PNG can begin to realize its own National Goals as set out in its Constitution.