Brongersma-Sanders⁵ has suggested that the mass mortality is due to poisonous blooms of dinoflagellates such as *Gymnodinium*, but this is discounted. It is argued that the decay of dense plankton on the shelf leads to a depletion of oxygen at the lower levels. Under normal meteorological conditions the currents bring in new supplies of oxygenated water, but during periods of calm, stagnation occurs and anaerobic conditions develop at the bottom which favour the growth of sulphate-reducing bacteria and the evolution of poisonous sulphuretted hydrogen. Oxygen depletion actually extends to the surface inshore and there are press reports from Swakopmund of the sea bubbling with hydrogen sulphide and mud

islands rising to the surface. This, the authors infer, is the cause of the mass mortalities of fish, and certainly their meteorological evidence and vertical sections of dissolved oxygen tie in neatly with the theory.

The authors have shown that the Benguela is one of the richest currents in the oceans of the world. This impressive report provides a firm basis for its further study.

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¹ Currie, R. I., *Nature*, **171**, 497 (1953).

² Hart, T. J., *Nature*, **171**, 631 (1953).

³ Defant, A., *Landerkd. Forsch. Festschr. N. Krebs.*, 52 (1936).

⁴ Sverdrup, H. U., *J. Mar. Res.*, **1**, 155 (1938).

⁵ Brongersma-Sanders, M., *Arch. Neerl. Zool.*, **7**, 291 (1945).

NATIONAL FORESTS OF AGRICULTURAL CROPS FOR THE WET HUMID TROPICS

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THE natural vegetation of the wet humid tropics consists of extensive forests of large and valuable timber trees. These large trees are of paramount importance in protecting the soil of the hillsides from erosion and its consequences, and they make the best use of the leached and acidic soils commonly found in the wet humid tropics. This forest of large trees has been, and is being, selectively destroyed to make way for 'planned forests' of agricultural crops such as rubber and oil palm, which are also able to make good use of such soils. There has been, however, a certain amount of misuse of such land in certain areas where food crops, mostly annuals, such as vegetables and short-lived perennials, such as papayas, have been cultivated. Such crops do not provide adequate cover to the soil, which is exposed to the elements and gives rise to serious soil erosion and unproductivity of the land. Such land has often been abandoned to fallow, and a system of shifting cultivation has been practised.

An ecological and economic study of the wet humid forests of certain agriculturally important large tree crops will show that there is a definite place for developing national forests of certain agricultural crops, which can grow under semi-wild conditions and which need occasional attention for satisfactory growth and crop-production. In Malaya, such agricultural crops are *Durio*, *Nephelium*, *Bertholletia*, *Garcinia*, *Lansium*, *Baccaurea* and *Metroxylon* species.

Most of the tree crops mentioned have the following characteristics:

(a) A number of them to this day is grown successfully under semi-wild conditions, and it is doubtful whether it is more economical to grow them under refined cultural techniques.

(b) The trees grow to a large size and would function effectively as binders of the soil and efficient utilizers of leached and acidic soils, as the natural forest-trees do.

(c) It is questionable whether such crops should be grown by smallholders who have only small pieces of land.

(d) The trees take 7-15 yr. to mature and are therefore not ideal for smallholders who lack capital for growing perennial crops. On the other hand, perennial crops are ideal from the point of view of the little work required to maintain crop production.

(e) The trees are seasonal in bearing, although there is one season of heavy bearing and another negligibly light one annually.

(f) There is negligible damage done to the trees in the process of harvesting the produce and is unlike rubber-tapping, which is done daily, and where inexperienced labourers can damage the trees permanently.

Therefore seasonality of fruiting, semi-wild conditions of growth to large trees and negligible damage done to such trees during the harvest provide conditions which not only find employment for labour that is occasionally unemployed at certain times of the year in the country, and prevent erosion of soil which is a national asset, but also permit the public to harvest the produce on annual lease, which can be called by tender.

Some of these trees have good durable timber, and should the trees go out of production (and this will only occur after several decades) the timber produced would give some remuneration.

At this point a question may be raised about finding planting material and the need for ensuring that planted trees bear high quality and quantity of produce. This is possible by adopting the following theoretically sound but yet unproved technique:

Seeds from trees selected for quality and quantity of produce will, in most cases, be satisfactory as planting material since this technique is practised to this very day in most of these tree crops. However, the individuals will vary in quality and quantity of the produce. In order to minimize the variability it is suggested that in planting the seedlings, twice or thrice the usual number of plants, at closer spacing, can be planted within a unit area, so that it would be possible to destroy progressively half the number of the poorer trees within a unit area, from the time the trees start bearing, to permit good growth of the remaining better trees.

By these methods, therefore, it is theoretically possible to create national forests of agricultural crops in the wet humid tropics where large acreages are still under forests. However, capital will be the problem and this may be found should the national policy-makers be convinced that the idea of national forests of agricultural crops in the wet humid tropics is sound not only theoretically but also practically.