



FIG. 1. The heraldic sign of the Wau Ecology Institute (WEI). On the left is a bird-of-paradise and on the right are characteristic animals of New Guinea. The main island includes 'West Irian' and, after Greenland, is the world's largest non-continent island, being nearly 800,000 sq. km in total area.

WEI is located on the lower slopes on Mount Kaindi (2,362 m), at 1,200 m in Wau Valley (7°S; 146°E), 150 km by road from the port city of Lae. A branch station is located in *Nothofagus* forest on the summit of Mt Kaindi, and is accessible by road. Several field-camps have been established on the slopes of Mt Missim (2,900 m), which spans the north side of Wau Valley.

The WEI grounds encompass 80 ha and include a large arboretum of native plants, remnant forest, coffee and experimental gardens, rhododendron and vegetable gardens, and a small zoo (Fig. 2). There is a laboratory with library, plant and animal reference collections, dry rooms with basic equipment and some working space, and a dark room. There are also a hostel, some guest houses, and vehicles for rent or sharing. The branch station on Mt Kaindi has bunks, a kitchen, electricity, and a small laboratory. Extensive meteorological data are regularly collected there.

WEI is located near the interface between *Araucaria* and 'oak' (*Lithocarpus-Castanopsis*) forest. Higher elevations are dominated by *Elaeocarpus* (1,700–2,100 m), *Nothofagus* (2,100–2,500 m), and conifers (mainly Podocarpaceae, 2,500–3,000 m). Areas above 3,200 m have a mosaic or *Danthonia-Deschampsia* grassland, forest, or tundra. Expanses of *Imperata*, *Rhododendron*, *Vaccinium*, *Banksia*, *Cycas*, etc., occur from 1,100–1,700 m east of Wau.

The Wau Area is rich in rhododendrons, with over 25 species. Towards the sea there is easy access to hill-, lowland-, and swamp-forests, as well as to sago and mangrove swamps, lowland savanna, and grassland. Several hundred species of birds, including 14 species of birds-of-paradise and many parrots, as well as about 65 species of mammals

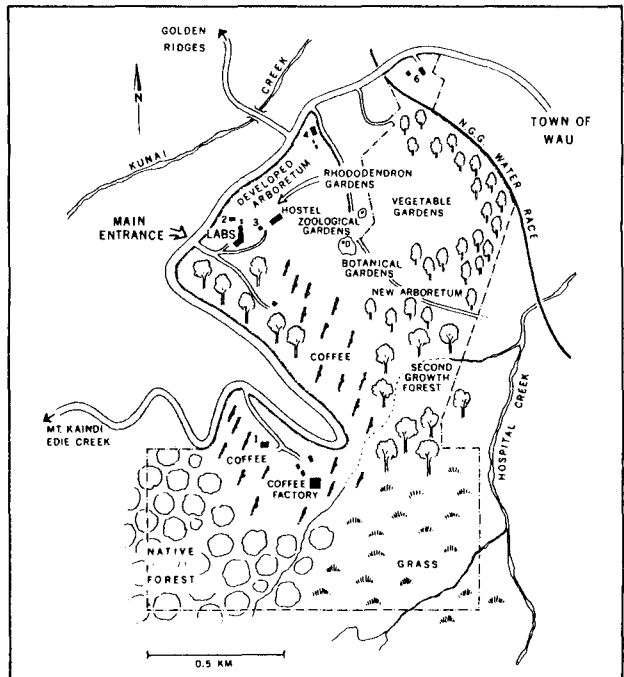


FIG. 2. Sketch-map showing layout of main features of the Wau Ecology Institute, Papua New Guinea.

and many reptiles, amphibians, and of course insects, occur nearby.

WEI is engaged in project work concerning conservation and medicinal plants. It is a non-governmental, non-profit-making, cooperative, that can assist in preparation of requests for grants and in providing information, but cannot provide financial support. WEI has published handbooks on frogs, beetles, birds, rodents, reptiles, and subsistence-agriculture improvement, as well as on the local environment. Publications and information are available from WEI, and further publications are in preparation.

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Food Safety: A World-wide Public Health Problem

Despite the advances of modern technology, keeping food safe for humans remains a world-wide public health problem in both developed and developing countries. Illness resulting from contaminated food is a leading cause of sickness and death especially in the less-developed world, and affects untold millions in all countries.

While few precise figures are available, WHO estimates that only a fraction of food-borne disease is currently recognized and reported throughout the world. In less-developed countries, the ratio between actual and reported cases may be as high as 100:1, while in industrialized countries the food-connected health incidents that are reported still probably represent far less than 10% of the actual total.

Acute Diarrhoea a Killer

Contaminated food is responsible for a high proportion of diarrhoeal and other infectious diseases, particularly in the less-developed world. WHO estimates that in 1984 there were about 1,000 million episodes of acute diarrhoea among children under five years of age in Africa, Asia (excluding China), and Latin America; the disease proved fatal for nearly five million cases.

Diarrhoea is a significant health-problem for the adult population too—especially for those who travel. Of some 2,600 million people who travel each year for business, pleasure, or other reasons, WHO estimates that between 20% and 50% suffer from diarrhoea, much of it caused by contaminated food or water.

WHO receives reports each year of tens of thousands of cases of foodborne diseases among all age-groups in Canada, Japan, the United Kingdom, the United States, and other developed countries, where these diseases are a leading cause of illness. But while the problem is indeed worldwide, it is particularly acute in the less-developed world, where poor nutrition renders the problem particularly severe. A vicious circle sets in: foodborne diseases lead to impaired digestion and absorption of nutrients—until resistance to illness is reduced, causing further sickness and, in many cases, death.

Contamination of food can thus affect whole populations. Thus gastro-enteritis occurs in Indonesia in more than 40% of the population every year, and is recognized as responsible for much malnutrition—especially when accompanied by acute diarrhoea. In Thailand, gastro-intestinal infections accounted for 60% of all illnesses in 1979, and were the main cause of death there; much the same was true in Colombia, Costa Rica, Egypt, and Mauritius.

Causes of Food Contamination

Contamination is often caused by faulty handling, storage, and/or preparation, of food. Examples of traditional food habits and customs which perpetrate contamination include:

- Eating fermented pork in Northern Thailand and raw sausage in Central Europe puts people at risk of contacting trichinellosis.
- A preference for uncooked or undercooked meat in some communities may cause illness because not enough heat has been applied to destroy all dangerous pathogens.
- The taboo found in some countries on handwashing following certain activities which dirty the fingers. This frequently leads to contamination of food handled subsequently.
- Partially pre-cooking a Thanksgiving turkey, a time- and work-saving tradition in the USA, can be dangerous. Often weighing more than 10 kilograms, the large bird requires many hours of cooking to eliminate pathogens or toxins. Multiple cooking over a period of days is normally not enough to do this, and may even add to the risk.

Most food contamination is microbiological in origin. However, in both developing and developed countries, the widespread use of chemical substances throughout the food-production chain has increased the risk of chemical contamination in recent years. Chemicals commonly used include agricultural pesticides and fertilizers, veterinary drugs and growth stimulants, and food additives.

Other varieties of chemicals—such as compounds of lead and cadmium—are not intentionally brought into contact with foodstuffs and have nothing to do with food production. But they find their way into the food-chain from the general environment, and pose a risk to public health.

Food is one of the most important commodities in all national economies, and its contamination results in substantial economic losses. In some countries, food losses due to preventable spoilage can run to as much as 30% of the total crop. Moreover, the social cost of food contamination includes the costs of treating the induced diseases, and loss of output or earnings resulting from illness, disability, or premature death.

The Importance of Health Education

Outbreaks of foodborne diseases can be reduced if both professional and domestic food-handlers understand the importance of correct hygienic practices. Health education is one of the most effective means of eradicating the problem, but will only work if it reaches, motivates, and convinces, all those who are involved along the human food-chain.

Hygiene practices are often hampered by ingrained traditions and practices, as well as economic limitations. Therefore, health education on safe food-practices must involve not only policy-makers and health authorities, but also consumer organizations and the general public.

Children can be useful in passing on to their parents new, health-related messages acquired at school. Other means of health education include radio messages and visits from community health-workers.

The WHO Food Safety Programme

The World Health Organization has an active programme in food safety which aims to improve programmes for monitoring and control of foodborne hazards (microbial, chemical, and others), so as to reduce the incidence of these diseases in the population. The programme lays particular stress on involving communities in taking the necessary measures, and also cooperates with Member States in improving and strengthening food control-systems, including legislative measures. Some of these activities are carried out in collaboration with the Food and Agriculture Organization (FAO) and other organizations.

Making food safe also requires government action. Regulations that could make food safe, and enforcement of food-safety standards, are often limited in the less-developed world. Governments should seek to educate and inform, in addition to enacting and enforcing regulations aimed at making safe food a habit rather than just an obligation. Meanwhile WHO is also seeking assistance from the food industry in the fight against foodborne disease. Food producing, processing, and handling, companies can help by promoting positive health messages.

Another important element in promoting international trade in safe food is the Codex Alimentarius Commission. Working under the auspices of WHO and FAO, the Commission's aim is to ensure the safety of food-moving in trade, and to provide guidelines for national food control through its standards and codes on various food commodities, raw materials, installation facilities, processing, and general hygiene.

To sum up: safe food is vital to conserve valuable energy, proteins, vitamins, and other principles and substances, which are necessary for human nutrition. Especially in the less-developed world, safeguarding food could save millions of lives and ensure that millions more do not suffer the dire consequences of foodborne disease.

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