

councils". The working party, chaired by Professor A G Mackie, surveyed the university non-tenured research staff and found that only half obtained permanent jobs on completion of their contracts, while 11% were unemployed and 32% had moved to other temporary jobs.

UNEP shames Mediterranean countries to pay bills

A MILITANT speech by United Nations Environmental Programme deputy director, Peter Thacher last week (*Nature*, 14 February page 613) has produced promises of payment by the delinquent participants in the Mediterranean clean-up programme. Italy has promised its \$745,000 arrears by April, Spain its \$412,000 payment by December and France its remaining \$573,000 "sometime this year". In addition cheques which have not arrived from Turkey, Yugoslavia and Monaco will be traced. The pollution programme will be forced to close in seven weeks if part of the money is not made good. In another major result at the three day meeting in Barcelona, Algeria signed the 1976 Barcelona pollution accords leaving Albania and Turkey as the only non-signatories. Algeria's signing signals important Third World support for the clean-up programme, expected ultimately to cost \$15 billion over 10-20 years.

France and India sign new technical agreement

FRANCE and India have signed seven new protocols for technical and economic cooperation which include research in renewable energies, oceanographic technology, and the development of semi-arid regions of the left bank of the Rajasthan Canal and the Bundelkhandmaree of Uttar Pradesh. Signed by French President Valéry Giscard d'Estaing on his visit to India last month, the protocols will also attempt to solve the long standing problem of Franco-Indian cooperation — the inability of India to make use of French credits because of the high cost of French equipment and technical service. **B. Radhakrishna Rao**

Sri Lanka to set up basic research institute

SRI LANKAN President J R Jayawardene announced last week to establish an institute for basic research to be housed at a site near Colombo by November of this year. The culmination of nearly a year of discussions between the President, local scientists, and several expatriate Sri Lankan scientists, the institute will emphasise advanced study in all branches of fundamental science. Professor N C Wickramasinghe, head of the department of mathematics at University College, Cardiff, UK, has been mentioned as a candidate for director of the institute.

FEATURES

Papua New Guinea (PNG) is one of the world's least "developed" countries. A third of its three million people have only emerged from the neolithic age over the past 40 years. The people are divided by mountain ranges reaching 4,700m, torrential rivers, forests, ravines, seas, malarial swamps and language — more than 700 are spoken. But in the five years since independence from Australia, the government has launched an ambitious Improvement Plan, under which western

science and technology are being introduced enthusiastically. All projects are funded by the National Public Expenditure Plan, which absorbs 21% of all spending. The main national aims are equal distribution of development among a population that is 85% rural and largely dependent on subsistence farming and a reduction in the number of western expatriates on whom development still largely depends. Both aims are meeting with mixed results, as **Tony Ades** reports

Appropriate technology:

PAPUA New Guinea's Eight Point Improvement Plan calls for self-reliance, less dependence for its needs on imported goods and services. Most conspicuous among imported services are those of the 4,200 expatriates employed by the government. While nearly all political posts are filled by nationals, expatriates have a dominant role in formulating policy and planning its execution.

Since self-government in 1973 the number of expatriates has fallen from 50,000 to 30,000, partly as a result of the localisation programme, the replacement of expatriates by nationals. In the public service, the proportion of expatriates has dropped by 10%, but there seems to be no hurry to enforce the planned 4% reduction per year because the number of qualified nationals is not increasing as fast as the nation's need for skilled administrators.

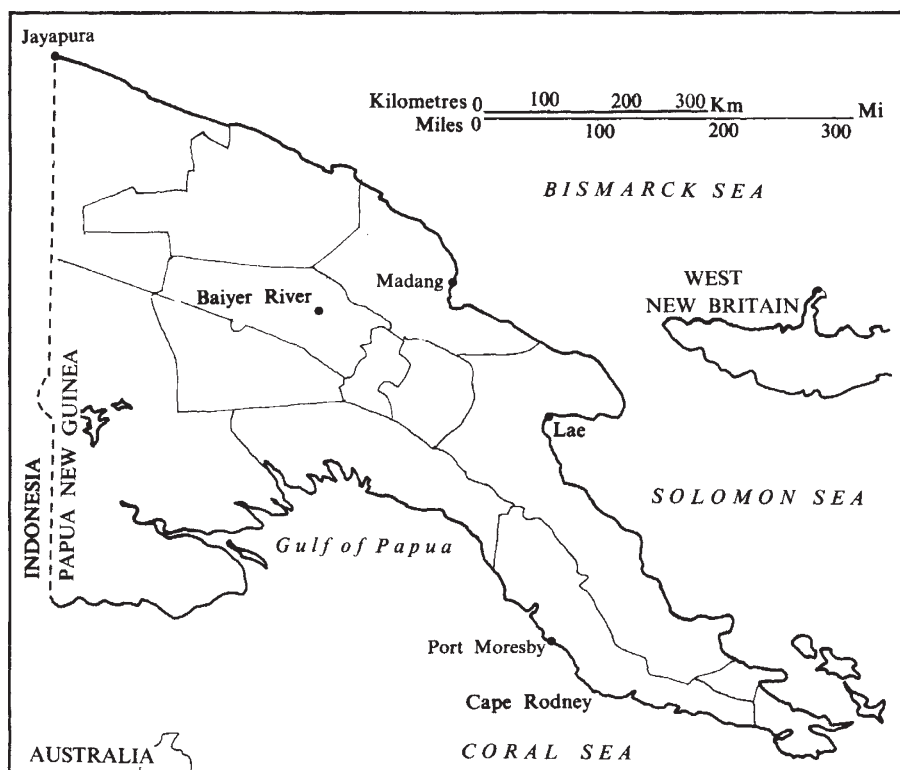
There are sound economic reasons for localisation. The average expatriate costs the government four or five times as much as the average national, and even at the same level the expatriate will earn between two and three times more. Also, their incomparably higher standard of living creates unfulfillable hopes in the local population. However, unlike most developing countries, PNG had no western-trained elite to take over at independence. Furthermore, the sheer inaccessibility of much of the country has brought education very unevenly. In the highlands, where many gratefully recall how the first Europeans ended interclan fighting after the Second War, people are

inclined to believe that localisation has been going too fast, leaving them permanently disadvantaged to the coastal peoples whose longer contact with the West and higher levels of education give them disproportionate political power.

Of all government services it is in fact education where localisation has been most dramatic. By 1972 all primary school teachers were nationals. Since then the number of teachers has doubled to 10,000. And although 60% of all children now attend primary school, there has been a serious fall in standards that will take many years to work itself out of the system. In the meantime, localisation of secondary school teaching is going ahead.

The standards problem is most severe in science and mathematics. Complaints that young men and women training to be Health Extension Officers or agriculture technicians cannot calculate drug dosages or areas are commonly expressed, and at all higher education institutions students take remedial maths courses that may delay their regular curriculum by up to a year. Whatever the economic and political advantages of localisation, PNG's ambitious plans for development demand so much gathering of data on every aspect of the land and population, and so much administration, that many are asking whether localisation too early has actually increased dependence on expatriates.

Tony Ades has a Nature writing fellowship and is currently at the PNG Institute for Medical Research, on leave from Sussex University, UK.



Papua New Guinea's view

An expansion of education and a consequent fall in average standards is not unusual in developing nations. In PNG it has led to demands, particularly from expatriate education planners, that a more merit-oriented system be introduced. At present, selection from one level of school to the next is based on a quota system biased toward children from lower quality schools and poorer regions. This policy is typical of the government's determination to redress regional imbalances. The government is equally unlikely to yield to suggestions that it drop its plan for 100% primary school enrolment by 1990, on the grounds that vitally needed extension services in health and agriculture are seriously hampered by illiteracy.

The concern for equality, rather than higher levels of education for a few, was based on the idea that PNG would adopt small-scale, labour intensive modes of development. At the time of independence there was a corresponding enthusiasm for "appropriate technology". But the Village Task Force, set up in 1974 to carry this through to the rural people, seldom progressed beyond the theoretical stage. Six years later, the South Pacific Appropriate Technology Foundation (SPATF) acts as an information clearing house and sets up small projects like village water supplies, but is still very limited in its capacity to create rural employment. Instead, SPATF has been set to work on the urban unemployment problem, and devises pilot projects such as furniture making.

Its research arm, The Appropriate Technology Development Unit at the University of Technology, Lae, is also more oriented towards hardware. It has designed a hydraulic ram pump that can be built with a drill press rather than an entire machine shop and is currently testing mini-hydroelectric schemes. The newly appointed Vice-Chancellor, Professor Alan Mead, has promised to involve more of the somewhat reluctant faculty in this type of work, but there exists as yet no channel by which rural needs and technical possibilities can meet each other.

SPATF's explicit policy of "not telling people what they want" demands that people have some idea of what is available. It has always been hoped that the increasing number of school leavers, teachers, extension workers, and even some university graduates would return to their villages and catalyse development. But those few who try are often rejected by the village elders. Extension workers are now generally posted away from their own villages, losing the advantages of shared language and culture. On top of this, a western education, even if below western standards, does not prepare one for a return to a subsistence lifestyle. A student at the University of Technology told me that he might eventually go back to his village, but only when electricity had reached it and when television broadcasting had begun. Then he would help the village develop by selling and servicing television sets. Such views are not unusual.

The fact is that the "appropriate

technology" emphasis on locally available materials and skills, and on the natural evolution of simple technologies at the hands of the craftsmen who use them, is scarcely relevant in a country with no traditions in metal, cloth or draught animals. For many the first wheel came on an aeroplane. The arrival of science and technology has been headlong: generally it is capital intensive and oriented to a high return. Papua New Guineans have welcomed sophisticated telecommunications, the F-28 jets flown by Air Niugini, and the highly sought after four-wheel drive land vehicles. And at the government level there is certainly room to doubt the commitment to appropriate technology. In spite of the recommendations in its own national paper to last years United Nations Conference on Science and Technology for Development, PNG operates no assessment or vetting of imported technical hardware.

On the other hand, in the field of energy, PNG enters the technological age with more foresight than any developed nation, and with a comprehensive policy aimed at self-sufficiency through renewable resources. The present expansion of the road system and the growing monetarisation is forcing up fuel imports at 8% a year. To counter this the initial step is to be a cassava-to-alcohol conversion plant in the Baiyer River area of Western Highlands Province. The 2 million litres produced each year will be mixed at 15-20% with motor spirit. The plant will be in a remote area not only to bring rural employment, but also to offset government subsidies for fuel transport costs, which run to K3.50 (\$4.62) per gallon in the most inaccessible regions. (One PNG kina is worth \$1.32.) If this conversion plant is a success, more will be built. It is hoped that the use of alcohol fuels will eventually reach a level that would justify the import of cars that run on 100% alcohol. At that point large scale wood-to-alcohol installations would be built, drawing on waste from forestry operations.

PNG has so far decided against rural electrification. Other aspects of the energy policy include pilot projects for charcoal production, wood pyrolysis, firewood cropping, together with research into solar air conditioning, sago to alcohol conversion, and biogas plants. Meanwhile, several small diesel generators are to be replaced with photovoltaics. The entire programme, the brainchild of Dr Kenneth Newcombe at the Department of Minerals and Energy combines all levels of technology with a sensitivity to rural skills and needs. It is also an outstanding example of how much scope expatriate scientists and economists have in moulding the course of PNG's development towards, paradoxically, self-reliance.

While many components of the energy policy accord with official approval of small-scale industry, and are therefore consistent with the educational system's stress on quantity rather than quality, the

course of development appears to be moving in the other direction, calling for more skilled management than is available. A shift away from smallholder projects is becoming evident. For example, cattle smallholdings are to be replaced with ranches owned by entire clans, worked by hired labour and large enough to pay the services of an expatriate manager. A flagging smallholder rubber development at Cape Rodney, Central Province, is to be revitalised by the addition of a central estate. The World Bank's Southern Highlands Development scheme also opts for nuclear estates. The Baiyer River alcohol plant will be supplied with intensively farmed cassava. The rice and sugar projects now under consideration not only have no place for smallholders, but are on a very large scale indeed.

The causes of this trend go deeper than economies of scale and the unstable output of smallholders. Officials concede that there has been insufficient effort to make the smallholder self-reliant. Extension officers have arranged for bank loans to farmers and taken most of the decisions to ensure that the loans are repaid. Effectively the smallholder is turned into a labourer on a government-managed farm. On top of this is the difficulty of extension work among a largely illiterate population with a chronic shortage of staff. Yet the government is committing only K300,000 (\$396,000) a year to adult literacy programmes. Moreover, Rural Development Assistants, who comprise the vast majority of agricultural extension staff, are to be phased out altogether. They will eventually be replaced with smaller

numbers of better-trained staff, but an increasing proportion of students graduating from agricultural colleges go into private business for themselves.

Eventually, the educational system will probably iron out the currently erratic course of development at the rural level, if, that is, its western orientation does not promote dissatisfaction with rural life. However, it may be perpetuating the lack of local expertise which recently led the Prime Minister Mr Michael Somare to try to drum up Australian investment. PNG is not at the mercy of foreign capital. Its laws clearly demarcate the areas in which investment is welcome, and it regulates the form that foreign business activities can take. But critics point out that this can only serve to amplify the gap between the still expanding subsistence population and the wage sector, and further disrupt the former.

In addition to this, the growing indigenous commercial interests, with their increasing political influence at provincial level, are also aiding the push towards a more capital intensive wage sector and away from subsistence and smallholder farmer. A related danger is that provincial governments are threatening to make their own arrangements with foreign companies, but have less ability to ensure favourable terms than the national government.

In accordance with its stated policies, Papua New Guinea is slowly achieving self-reliance as a nation, and redressing the inequalities between its regions. The question is: can it at the same time bring self-reliance and equality to its people? □

Eric Ashby (right) looks at a recent report on public participation in technology decision-making in OECD countries and argues that better public information could reduce disenchantment with representative democracy

THE WINDSCALE enquiry in Britain and the Mackenzie Valley Pipeline enquiry in Canada were highly publicised experiments in participation. They were responses to a demand which has now become insistent, for "a greater degree of public accountability, freer public access to technical information, more timely consultation on policy options, and a more holistic approach to the assessments of impacts", to quote a report on participation from the Science Policy Division of the Organisation for Economic Co-operation and Development.

The report, *Technology on Trial*, by K. Guild Nichols, published in Paris last year, is a clear and useful account of the present state of the art of participation in OECD countries. The important point Nichols makes is that this demand is a symptom of a much deeper social disturbance — a disenchantment with the whole process of representative democracy.

The public elect people to represent their interests and straightway distrust them. Through the mass media self-appointed leaders who claim to represent the public interest can bypass the traditional hierarchy of procedure and appeal direct to the people over the heads of legislators. Nichols quotes Paul Valery: 'all politics is based on the indifference of most of those concerned, without which politics would be impossible'. If Valery was right, we are in for trouble; for concern, as measured by the number of people prepared to vote (for instance) in the referendum on atomic power held in Austria in November 1978, is spreading, and indifference to such great issues can no longer be assumed by those who make decisions.

Governments in pluralistic democracies are embarrassed by this surge of interest; as indeed they need to be, for this desire that the general public should participate in the decisions that affect their lives is undeniable in theory and confoundingly perplexing in practice. There is no such thing as monolithic public opinion. Even groups of people who agree about what is in 'the public interest' may do so for different reasons: one because he genuinely fears a nuclear economy; the other because he doesn't want a power station to spoil his view. The utilitarian calculus — that a social welfare function is the sum of a multitude of individual welfare functions — is a discarded and useless concept. The assumption, accepted for a long time by the man-in-the-street, that major

Depending on foreigners for self-reliance: expatriate manager (right) with cattle smallholders rigged out in clan gear

