Annex 1

Terms of Reference of the Group of Experts

At the Kuala Lumpur Meeting held in October 1989, Commonwealth Heads of Government requested the Secretary-General to identify a group of experts on the environment who could monitor and evaluate developments concerning climate change, taking into account the work of the Inter-governmental Panel on Climate Change, and deal with other environmental issues as needs arise.

At the same meeting, Heads adopted the Langkawi Declaration in which they committed themselves to a programme of action which would, inter alia, facilitate their participation in relevant international agreements relating to the environment and the promotion of new and innovative instruments which will attract widespread support for conserving the global environment.

Commonwealth Ministers responsible for Women's Affairs, at their Meeting in Ottawa in October 1990, considered among other subjects the question of how to integrate women into decision-making on environmental matters and promote their greater involvement in local, national and international efforts to conserve the environment. Ministers emphasised that women's perspectives on environmental issues should receive adequate international attention. They asked the Secretary-General to convene a meeting of Commonwealth Experts on Women, the Environment and Development to discuss these issues and make recommendations to the 1992 UNCED and the preparatory process leading up to it.

To meet these requests for work to assist Commonwealth governments, and particularly in relation to the 1992 UNCED, the Expert Group will examine all issues on the UNCED agenda of special interest to the Commonwealth

and at the same time give particular attention to the problems of small states and the relationship between women-in-development and environmental concerns, on both of which Commonwealth governments have expressed keen interest.

The Expert Group will advise Commonwealth governments on ways to assist implementation of the Langkawi Declaration and to facilitate effective Commonwealth participation in the 1992 UNCED. In particular, the Group will:

(a) clarify the main issues before UNCED, identifying those which are of special concern to the Commonwealth;

(b) identify major issues of concern to Commonwealth countries in the context of ongoing and future international negotiations on environmental problems (e.g. biodiversity, climate change, tropical forests, international traffic in hazardous wastes, marine pollution etc.);

(c) identify ways of facilitating the participation of Commonwealth and other developing countries in global agreements and assisting their efforts to undertake adequate action on conserving the environment, with special attention to financing and technology transfer arrangements;

(d) give particular attention to issues of special concern to small states and how their interests can best be promoted at UNCED; and

(e) consider the nature and extent of women's management of the natural environment, particularly measures to improve their effectiveness as natural resource managers and their ability to benefit from this role, and advise on mechanisms which will facilitate the greater participation of women in decision-making on environmental matters at both domestic and international levels.

The Group will make specific recommendations in the above areas, for consideration by Commonwealth governments and the wider international community.

Annex 2

Renewable Energy Sources

Solar energy schemes come in two basic types. In the first, photovoltaic (PV) panels convert sunlight into electricity through the photo-electric effect on semi-conductor materials. In the second, thermal-solar, solar radiation is focused onto a heat exchanger containing heat-absorbing fluid which can raise steam to power turbo-generators. Alternatively, it can heat water directly, as in households or public buildings. Currently, the largest project of the first type has a capacity of 7.5 megawatts (MW), and of the second, 10 MW. Both are in the USA. India is also undertaking major solar power projects. There is a high level of commercial interest[1].

In developing countries, especially in regions of high insolation such as the Caribbean and Mediterranean, solar technologies are mainly being used for heating water in houses and public buildings such as hospitals and schools. The larger schemes are more land-extensive, but they still compare very favourably with hydro projects, and are flexible in their choice of site and size of unit, since the technology is modular. Costs are falling rapidly—from $200,000 per peak kilowatt of capacity (kWp) for PVs in 1970 to $6000/kWp in 1990, and projected to be $2,100/kWp in 2000, and $1000/kWp in the long term. The decline in costs has been due to economies of scale in production, technical progress in producing components and materials, and improvements in the efficiency of conversion.

At these investment costs, and with their low operating costs, solar power schemes will be both economically and environmentally attractive over the next generation to developing countries with sufficient insolation. PV systems are cost-effective for applications far from existing power lines, such as isolated settlements or installations, or for rural electrification where the cost of extending the grid would be prohibitive. Small-scale PV systems for lighting, telecommunications, water pumping and refrigeration have been

introduced to isolated rural locations in several Commonwealth countries in the South Pacific. PV is competitive with diesel generators at capacities below 20 kW. The technology could penetrate the market for diesel-powered water pumps operating at low kW capacity—of which India has 4-5 million. In sub-Saharan Africa, photovoltaic pumps provide water at the lowest cost for villages with up to 2000 people. For villages with a higher population, the cost of diesel-pumped and solar-pumped water is roughly equal[2].

In regions with large seasonal variations in sunshine, solar systems can be combined with diesel generators in 'mini-utility' systems for providing the power needs of remote locations. Such a system operates in an island off Australia, and is potentially applicable to African villages and South Pacific and other islands.

Wind-generated electric power is close to becoming competitive with thermal generation (in the USA the gap has narrowed to 2 cents per kWh). Wind generation units are available in small sizes and mass-production is possible. Many other technical improvements are possible, and the US Department of Energy estimate that over the next two decades the cost of wind power at sites with a moderate wind regime could fall to 3.5 cents per kWh[3].

Mini-hydro schemes tap water power without the environmental costs associated with major dams. They can either be run-of-the-river or based on small impoundments, are viable on a small scale, have negligible operating costs, are easy to maintain, and are ideal for small and isolated communities. According to one estimate in 1990 by the US Agency for International Development, the capacity of small stand-alone hydro-plants in developing countries, serving community and agricultural complexes, will reach 29,000 MW in 1991, three times the installed capacity in 1983. World-wide potential for small hydro-plants exceeds 100,000 MW.

Biomass fuel, especially wood, is the predominant form of energy for cooking and heating in the poorer developing countries. Biomass is widely available, versatile (for power generation, gaseous, liquid or solid fuel), the technology is well established, and it is a form of stored energy. As a substitute for petroleum, the use of biomass for liquid fuels is still substantially more expensive.

However, biomass is more attractive in generating electricity. Wood and agricultural waste can fuel steam-turbine co-generation systems to produce both heat and power. A plentiful source of biomass at low cost is essential, as in the residues of sugar cane production. In Brazil the production of ethanol from sugar cane is competitive with imported oil when the latter is at $24 per barrel—and further cost reductions are likely[4]. In the 80 developing countries producing sugar cane it has been estimated that gasifier-gas turbine systems

could produce half the power that is now generated from all sources. The main qualification to this scenario is that biomass used in power generation should not be at the expense of local people's fodder, fuel and building material, unless acceptable substitutes could be provided. Vegetation for biomass energy production should be continually replanted to avoid net contributions of CO_2 emissions to the atmosphere.

Ocean energy could potentially be harnessed in many small islands and coastal areas, either through utilising tidal differences, waves, or ocean temperature differences (through Ocean-Thermal Energy Conversion—OTEC). Although no technology for these three options is as yet commercially available or economically viable, further research and development on all three should be supported. Concomitantly, data collection on the potential for ocean energy, particularly for small island developing countries, should be systematically carried out wherever this has not already been done.

References

1. Dennis Anderson, *International Aid and the Environment*, Overseas Development Institute, London, September 1991.

2. "Reassessing Solar Power", in *SOURCE*, UNDP, New York, June 1991.

3. Carl J Weinberg and Robert H Williams, 'Energy from the Sun', *Scientific American*, Vol. 263/3, September 1990.

4. K N Amulya Reddy and José Goldemberg, "Energy for the Developing World", *Scientific American*, Vol. 263/3, September 1990.

Annex 3

Group of Experts on Environmental Concerns and the Commonwealth

Members of the Group

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