MAKING A DIFFERENCE IN LDCs

IAEA PARTNERSHIPS SUPPORT AIMS IN LEAST DEVELOPED COUNTRIES

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No single organization can realize the world's goals for sustainable development. Broad engagement with a variety of actors is needed. This is especially the case to help determine where science and technology can play the best role, particularly in Least Developed Countries (LDCs).

One mechanism which the IAEA Technical Cooperation Programme uses for nuclear science and technology is regional agreements between governments. This brings a double benefit: it strengthens technical self-reliance and it enables more advanced institutions within a region to act as technical mentors for less advanced ones, particularly those in LDCs.

For instance, in Africa, the African Regional Cooperative Agreement (AFRA) is an intergovernmental agreement between 26 African nations, including 12 LDCs. East Asia and Pacific has an agreement (RCA) between 17 nations, including Bangladesh, Myanmar and Viet Nam. The agreement in Latin America (ARCAL) involves 19 nations, including Nicaragua. These mechanisms promote uses of radioisotopes and other technologies to solve urgent socio-economic problems, while IAEA acts as technical advisor and cooperation partner.

The Technical Cooperation Programme for LDCs is built upon development of human resources through advanced training and expert support.

Several regional projects, for example, focus upon graduate level courses in nuclear science and technology for scientists. However, deteriorating economic situation in many LDCs make it difficult for some counterpart institutions to sustain the outcomes of projects.

A new strategy was adopted in 1995, to alleviate the underlying constraints. Upon request, essential spare parts and consumables which are not locally available are provided to facilitate, in particular, continuation of activities related to completed technical cooperation projects. Expert services are also utilized for consultancy missions and to assist in organizing local training events. To reinforce the scientific and technological base, training opportunities offer a "sandwich pattern", leading to advanced degrees in basic sciences and nuclear technology as part of an alternate (local-overseas) educational training programme.

Some examples of the role of nuclear science and technology illustrate contributions in fields of agriculture, health, and water to the Global Plan of Action for LDCs.

The Trypanosomosis Challenge: A Root Cause of Poverty in Africa. A major event last year foreshadows an opportunity of immense potential impact on social and economic development in Africa. In July 2000, African Heads of State and Government meeting at the Organization of African Unity (OAU) Summit in Lome, Togo, recognized the importance of trypanosomosis as a root cause of poverty. They declared 2001 as the year of the control of tsetse fly, which transmits the disease and stands among the leading constraints to rural development in sub-Saharan Africa. It continues to frustrate efforts and hamper progress in crop and livestock production thereby perpetuating hunger, poverty and suffering in the poorest communities. Trypanosomosis causes both human and animal diseases. Major effects include the uneven distribution of livestock across the tsetse belt, the inability of farmers to use draught animals in crop production, and distorted land utilization and settlement patterns.

The World Health Organization (WHO) recognizes that human sleeping sickness has come back as a disease of major public health

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importance and is in the midst of resurgence in sub-Saharan Africa. However, it occurs in remote areas, making it difficult to estimate the incidence and prevalence of the disease. Only around four million of the estimated 60 million people at risk of the disease were under surveillance. Some 500,000 rural people, including many children, are believed to carry pathogenic trypanosomes. Without treatment many die.

The Food and Agriculture Organization (FAO) of the United Nations estimates that over three million cattle and other livestock die each year from trypanosomosis. To control the tsetse, FAO estimates that over $200 million is spent annually by governments, farmers, and researchers. About 35 million doses of trypanocidal drugs (worth about US $35 million) are bought every year trying to protect livestock through frequent treatments.

But core problems remain, signalling the need for new intiatives to more effectively invest in sustainable solutions. Every year, tsetse-affected African countries still suffer direct losses, chiefly to meat and milk production, estimated at $1.2 billion. Indirect loses are estimated at $4.5 billion a year.

Results & Outlook. The importance of the OAU declaration is that governments have taken note of the successful eradication of the tsetse fly on Zanzibar Island and of the opportunities in mainland Africa for control programmes, such as in the Southern Rift Valley of Ethiopia. The declaration highlighted the importance of areawide campaigns and the key role of the sterile insect technique (SIT) for eradication.

The objective of eradication has become the collective responsibility of Africa, while the OAU Secretary General is charged with the responsibility to initiate and lead a Pan African Tsetse and Trypanosomosis Eradication Campaign (PATTEC) and to seek support from all partners.

PATTEC was initiated by African countries to eliminate tsetse and trypanosomosis from the continent within the shortest time possible. It will pursue a phased strategy to establish a progressively increasing number of tsetse-free zones. To support the campaign, a technical advisory forum is being set up of representatives from the IAEA, FAO, WHO, OAU/Inter-African Bureau of Animal Resources (IBAR), International Scientific Council for Trypanosomosis Research and Control (ISCTRC), the Pan African SIT Forum, and the Program Against African Tsetse and Trypanosomosis (PAAT).

Partnerships & Commitments. The vision, commitment, and strategy initiated by the African Heads of State and Government strongly compel the IAEA to support the PATTEC Plan of Action, through expanded collaboration on technical support (SIT), operational support (area-wide concept), joint programme planning and feasibility work, and project/programme coordination. The IAEA has made a long-term commitment through technical cooperation ($30 million), research, development and technical expertise for SIT ($30 million) covering the next ten years.

Detection of Drug-Resistant Malaria & Tuberculosis (TB). Malaria and TB have particular relevance for the health and security of LDCs, particularly in Africa. The emergence and spread of drug-resistant strains of malaria and TB are widely seen as compounding the challenges faced by these health authorities. They pose serious implications beyond the highly burdened countries.

The conventional procedure for detecting drug resistance – culture sampling – requires four to six weeks; determination of drug susceptibility needs another three weeks. This prolongs infectivity and allows further spread of drug-resistant TB.

Recent developments in molecular genetics of malaria and TB have led to the identification of mutations in genes involved in resistance to front-line drugs. Molecular techniques using radionuclide tracers have reduced the time needed for identification of drug-resistant strains to less than one week. Tackling drug-resistant strains in LDCs helps not only those countries where the strains are found, but also those countries – in both the North and the South – to which they can move.

Results &Outlook. Since 1997, the IAEA has been helping nine States, including five LDCs, in sub-Saharan Africa. Efforts aim to enhance their capacity and validate the use of molecular and radionuclide techniques for diagnosis of drug resistance in malaria and TB.

In Mali, tests were carried out during a malaria epidemic and advice provided to disease control programme managers of resistance levels to two anti-malarial drugs, chloroquine and Fansidar. Within a few

days, (as opposed to the conventional test which takes 28 days) the results were in and showed chloroquine resistant mutations present in 75% of the samples, whereas no Fansidar resistance was present. Hence, Fansidar was used and was highly effective in controlling the epidemic. This probably saved many lives and definitely saved money for the hard-pressed national and local health authorities.

Sudan, Tanzania and Zambia also reported the presence of multi-drug resistant strains of TB. These scientists are working closely with disease control and surveillance authorities.

The IAEA is embarking on a new three-year project in collaboration with WHO and national disease control authorities to extend work done to date both technically and geographically. Plans call for:

- strengthening treatment response and/or in-vitro susceptibility testing;
- systematic monitoring of resistance genes in an effort to delay the development of drug resistant strains of malaria;
- developing data management and analysis systems;
- maintaining a network between participating institutes to facilitate information exchange;
- using statistical modelling to analyze transmission patterns of epidemic strains of TB, and to predict drug efficacy; and
- establishing sentinel sites for surveillance of resistance for both malaria and TB.

Constraints & Opportunities: Seeking New Partnerships. Diagnosis of drug-resistant strains of TB is only the first step in preventing these strains from spreading. Where located, drug-resistant TB needs to be brought under control with second-line drugs that are expensive. Provision of these drugs would not only help cure infected individuals and prevent the spread of drug-resistant strains, it would also allow for molecular analysis and clinical validation of these second-line drugs. Such data would be of global value, and the IAEA invites interested parties to contact the Technical Cooperation coordinator for Africa for more information.

New Directions, New Solutions. Malaria is a major health problem for Sudan, and the government is investigating a new strategy for disease control: eliminating the vector using the SIT technology. The National Health Laboratory in Khartoum and the Tropical Medicine Research Institutes are joining with IAEA and FAO to implement a project to assess the feasibility of the approach. If successful, a new tool would be at hand against a killer that claims nearly a million people a year in Africa, mainly children.

Increasing Water Security: The Role of Isotope Hydrology. LDCs are increasingly aware of the important role and potential contribution of isotope hydrology in addressing practical problems pertaining to water resources management. Several African LDCs are participating in a regional approach for integrating isotope techniques with ongoing national water resource management programmes. The implementation strategy utilizes the more advanced experience and technical capabilities of national institutes in South Africa, Kenya, and Egypt to support groundwater investigations in Ethiopia, Madagascar, Mali, Niger, Senegal, Sudan and Tanzania. Isotopic techniques are valuable tools for assessing key parameters and conditions of water resources.

Results & Outlook. An example of what can be done is in Ethiopia, where capabilities were established to assess groundwater resources as part of an effort to develop a national plan for groundwater exploitation in the southern Moyale region. Recurrent droughts affecting the population of about three million create a chronic shortage of water for drinking and irrigation. Results of the isotope hydrology investigations show a widespread recharge of the groundwater through rainfall, but at a much lower rate compared to previous estimates. The study also highlighted the potential of two aquifers in Moyale which potentially can be used for a new and sustainable rural water supply.

The IAEA is engaged in 19 technical cooperation projects involving groundwater investigations in LDCs. To achieve maximum impact from this programme, it is imperative that these activities are fully integrated within the government's overall water strategy. The need for partners in the water sector is essential because isotopic studies are not a stand-alone methodology; in fact they are completely dependent upon conventional hydrogeological assessments. IAEA-supported projects are leading to greater awareness among the world's water partners of isotope hydrology's role and how it can be effectively applied to contribute to the management of sustainable water resources where they are most needed. ❐