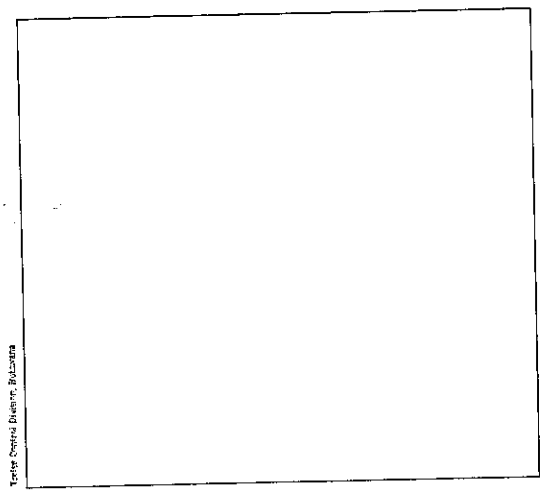
Trypanosomiasis Control in the Okavango Delta, Botswana[6]

African trypanosomiasis, a severe disease caused by parasitic protozoans in the genus Trypanosomais called "sleeping sickness" in humans and "nagana" in cattle. In Botswana, it is a problem only in the Okavango Delta in the north of the country. The delta is one of Africa's largest and most diverse wetlands, internationally recognized as meriting protection. A multi-million-dollar tourist industry depends on controlling the disease and its vector, the tsetse fly (Glossina morsitans centralis Accordingly, the Botswana government has given the program long-term political and financial support.

In 1993, after 20 years of annual ground spraying with DDT followed by the aerial application of other insecticides, the Tsetse Control Division of the Botswana Ministry of Agriculture switched to the deployment of host-odour baited cloth "targets" treated with small amounts of synthetic pyrethroid insecticide. The targets, which attract and kill tsetse, have maintained tsetse and disease control. The cost is similar to that of ground spraying with DDT, though due to high labour charges in Botswana, targets are about twice as expensive as aerial spraying.

The African tsetse control effort, including Botswana's, has benefited from excellent long-term, collaborative research by scientists in both implementing and donor countries, with the support of internationally funded regional projects. The cloth targets used in Botswana, as well as odour-baited tsetse traps used elsewhere without insecticide, represent the current state of the art. Research has also produced geographic information systems (GIS) to store, integrate, and display data, as well as a computerized data management system using global positioning via satellite to locate targets. They enable the monitoring of field operations, greatly improving target deployment



Tsetse Control Division, Botswana

Special odour-baited cloths used to trap tsetse flies can be produced and deployed by local communities.

and maintenance. In addition, the development of resistance to the synthetic pyrethroids used in targets is being anticipated with research to identify safe alternative insecticides, including insect-growth-regulating hormones and insect pathogens.

Tsetse control specialists have long demonstrated an awareness of the potential adverse environmental impacts of their health programs so they included environmental assessments and monitoring in their programs. As a result, control technologies continued to get safer and more sustainable, as well as more effective. Ground and aerial insecticide spraying led to severe acute effects on non-target animals and/or widespread contamination of wildlife with insecticide residues. In contrast, targets are relatively selective, non-polluting, and safe for workers. They reduce the hazard, persistence, and amount of insecticide used, as well as its contact with the environment and non-target species.

The Okavango Delta's cloth targets have another advantage that increases their sustainability: they lend themselves to production, deployment, and/or management by communities and the private sector. Surveys of tour operators and communities in 1996 found that large majorities of each group were willing to contribute to tsetse fly control, given appropriate compensation. Since human resources and transportation have historically been key limiting factors, these offers are potentially quite helpful. Mutually beneficial public-private partnership arrangements, involving rewards such as tax relief for tour companies and employment for community members, are under study.

Onchocerciasis Control in West Africa[7]

West Africa - Onchocerciasis control without DDT

Starting in 1946, and for nearly 30 years after, DDT was applied weekly to some West African rivers to kill larvae of blackflies in the genus Simulium which transmit onchocerciasis or "river blindness," a debilitating disease caused by the parasitic nematode Onchocerca volvulus. The Onchocerciasis Control Programme (OCP), started by a group of seven West African countries in 1974, is now achieving disease control with aerial application of much smaller amounts of alternative insecticides, combined with ivermectin, a drug treatment for infected people. The OCP, a multilateral project implemented by the WHO, was ultimately financed by a consortium of 21 donors, and expanded stepwise to cover 1.3 million square kilometres and 50,000 kilometres of rivers in 11 countries. Representatives of the WHO, the World Bank, FAO, and UNDP constitute the Committee of Sponsoring Agencies that oversees the project.

The OCP rejected DDT because of the risk of bioaccumulation and hazard to non-target species. The insecticide of choice, temephos, has a very low toxicity to

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71. IBID

72. A full report on the development and run results of the mass balance model for indoor exposures, prepared by Katie Feltmate, Dr. Don Mackay, and Eva Webster is available from WWF.

73. Mouchet, J. 1994. "Le DDT en sante publique." Cahiers Sante, 4: 257–62.

74. H.Bouwman et al. "Malaria control and levels of DDT in serum two populations in Kwazulu, J. of Toxicology and Enviormental Health 33(3): 141-155, 1991.

75. Mouchet, J. 1994. "Le DDT en sante publique." Cahiers Sante, 4: 257–62.

76. Feltmate, K., Mackay, D., Webster, E. 1998. "A model and assessment of the fate and exposure of DDT following indoor application." Report prepared for WWF Canada.

77. Department of Indian Affairs and Northern Development, 1997. Canadian Arctic Contaminants Assessment Report. Jensen, J, Adare, K., and Shearer, R., (eds.).

78. H. Bouwman et al, 1991.

Part C

1. A full report on the projects briefly profiled here, prepared by Dr. Patricia Matteson and co-authors associated with the various projects, is available from WWF.

2. In particular, Brazil has reduced malaria in the Amazon region by integrating intensified diagnosis and treatment, health education, and environmental management; see The Malaria Control Program in Brazil, presentation by Carlos Catao Prates at the UNEP/IFCS Subregional Awareness Raising Workshop on Persistent Organic Pollutants (POPs), Cartagena, Colombia 27–30 January, 1998.

3. Unpublished documents, Servicio de Erradicacion de la Malaria de la Secretaria de Estado de Salud Publica y Assistencia Social, Dominican Republic.

4. Gambia implemented a national impregnated bednet program on the basis of a pilot study described by B. M. Greenwood and H. Pickering, A malaria control trial using insecticide-treated bednets and targeted chemoprophylaxis in a rural area of The Gambia, West Africa, Transactions of the Royal Society of Tropical Medicine and Hygiene 87, Supplement 2:3–11 (1993).

5. C. F. Curtis, ed., Appropriate Technology in Vector Control (Boca Raton, Florida: CRC Press, Inc., 1989).

   Some individual programs are described in these references:

a. Village-level production in coconuts of B. thuringiensis israelensis for larviciding of malaria mosquitoes in Peru, in Of Mosquitoes and Coconuts, IDRC Reports, Vol. 19(1):17–19 (April, 1991);

b. Integrated malaria control including biological vector control with marketable fish as a source of local income in Pondicherry, India, P. K. Rajagopalan and K. N. Panicker, "Vector Control: How to Gain Acceptance and Support from the Community", WHO Chronicle 40(5):184-187 (1986);

c. Malaria control in Pudukuppam, Pondicherry, India through environmental management – algae cleared from ponds was used for village-level manufacture and sale of art paper, K. N. Panicker and P. K. Rajagopalan, A Success Story of Community Participation in Malaria Control (Pondicherry, India: Vector Control Research Centre Miscellaneous Publication No. 18, 1990);

d. IVC using bacterial larvicides and the selective spraying of vegetation as a successful alternative to altering Venezuelan wetlands for malaria control, R. H. Zimmerman and J. Berti, The Importance of Integrated Control of Malaria for the Preservation of Wetlands in Latin America, in Global Wetlands: Old World and New, W. J. Mitsch, ed. (Elsevier Science B. V., 1994).

e. Biological control of mosquito larvae through the distribution of larvivorous fish (guppies) is being credited with successful malaria control in Karnataka, India – see K. Acharya, "Biocontrol of Malaria Works in India", EnviroLink News Service, January 12, 1998.

6. P. C. Matteson, R. Allsopp, and G. R. Mullins, "Trypanosomiasis Control in the Okavango Delta, Botswana," in P. C. Matteson, ed., Disease Vector Management for Public Health and Conservation (Washington, D. C.: World Wildlife Fund, 1998, in preparation).

7. P. C. Matteson, "Onchocerciasis Control in West Africa," in P. C. Matteson, ed., Disease Vector Management for Public Health and Conservation (Washington, D. C.: World Wildlife Fund, 1998, in preparation).

8. R. K. Khaware and P. Kumar, "Malaria Control in Kheda District, Gujurat, India," in P. C. Matteson, ed., Disease Vector Management for Public Health and Conservation (Washington, D. C.: World Wildlife Fund, 1998, in preparation).

9. P. C. Matteson, "The Bagamoyo Bednet Project," in P. C. Matteson, ed., Disease Vector Management for Public Health and Conservation (Washington, D. C.: World Wildlife Fund, 1998, in preparation).

10. Lengeler et al. 1996.

11. Rozendaal, 1997.

12. C. F. Curtis (ed.) Appropriate Technology in Vector Control (Boca Raton, Florida: CRC Press, Inc., 1989).

13. P. C. Matteson, "The Philippine National Malaria Control Program," in P. C. Matteson, ed., Disease Vector Management for Public Health and Conservation (Washington, D. C.: World Wildlife Fund, 1998, in preparation).

14. P. C. Matteson and J. Ramirez, "Phasing Out DDT for Malaria Control in Mexico," in P. C. Matteson, ed., Disease Vector Management for Public Health and Conservation (Washington, D. C.: World Wildlife Fund, 1998, in preparation).

15. M. en C. J. Carabias Lillo, G. Quadri de la Torre and C. Cortinas de Nava, Programa de Gestión Ambiental de Sustancias Tóxicas de Atención Prioritaria (Mexico City: Instituto Nacional de la Ecología, 1997).