THEMATIC PLAN FOR ESTABLISHING TSETSE-FREE ZONES THROUGH AREA-WIDE TSETSE CONTROL INTERVENTIONS INVOLVING THE STERILE INSECT TECHNIQUE

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CONTENTS

1. BACKGROUND ........................................................................................................ 3

2. CONTEXT .................................................................................................................. 5
   2.1. Development Need .......................................................................................... 5
   2.2. Setting the Context of Trypanosomosis and Tsetse Eradication by Means of Area-Wide Interventions ................................................................. 6

3. STRATEGIC ROLE OF NUCLEAR TECHNOLOGY ........................................... 12
   3.1. The Sterile Insect Technique (SIT) ................................................................ 12
       3.1.1. Attributes of SIT .................................................................................. 13
       3.1.2. Justification ......................................................................................... 13
   3.2. Feasibility Considerations ............................................................................. 14
       3.2.1. Technical Considerations .................................................................. 14
       3.2.2. Economic Considerations .................................................................. 14
       3.2.3. Political Considerations .................................................................... 15

4. ROLE OF THE IAEA AND THE JOINT FAO/IAEA DIVISION ....................... 15

5. PROGRAMME STRATEGY ..................................................................................... 16
   5.1. Pan African Tsetse and Trypanosomosis Eradication Campaign (PATTEC) ................................................................. 16
       5.1.1. Phased, area-wide approach ................................................................. 16
       5.1.2. Co-ordinated action ......................................................................... 17
       5.1.3. Results-oriented ............................................................................... 17
       5.1.4. Use of appropriate technologies and approaches ............................... 18
       5.1.5. Ecologically-sensitive approach ......................................................... 18
       5.1.6. Participation ....................................................................................... 18
       5.1.7. Monitoring and evaluation ................................................................. 18
       5.1.8. Training ............................................................................................. 19
       5.1.9. Awareness Creation Campaign .......................................................... 19
       5.1.10. Information Management .................................................................. 19
   5.2. Roles and Partnerships .................................................................................... 19
       5.2.1. National Governments ...................................................................... 19
       5.2.2. Civil Society ...................................................................................... 20
       5.2.3. Donors .............................................................................................. 20
       5.2.4. International Organisations ............................................................... 20
       5.2.5. Regional and national research institutions, academia etc. ............... 20
       5.2.6. Private Sector .................................................................................... 20
   5.3. Organization and Operational Structure ......................................................... 21
       5.3.1. The African Heads of State and Government ...................................... 21
       5.3.2. The Secretary General of the OAU .................................................... 21
       5.3.3. Patrons and the Policy and Mobilisation Committee ......................... 21
       5.3.4. The Tsetse and Trypanosomosis Eradication Campaign .................... 21
       5.3.5. Regional and National Co-ordination Offices .................................... 21
       5.3.6. Regional Tsetse Eradication Centres ................................................ 21
       5.3.7. Technical Advisory Forum ............................................................... 22
   5.4. PATTEC Roles ............................................................................................... 22
       5.4.1. Identification of Target Areas ............................................................... 22
       5.4.2. Prioritisation of Areas ....................................................................... 22
       5.4.3. Project Categorisation for Selection .................................................. 22
       5.4.4. Project Initiation ................................................................................ 23
5.4.5. Project Support ........................................................................................................23
5.4.6. Harmonisation of Different Programmes ..............................................................23
5.4.7. Project Implementation .........................................................................................23
5.4.8. Project Appraisal: Monitoring and Evaluation ..................................................23
5.5. Operational Plans .....................................................................................................23
5.5.1. Process for the approval of the Plan of Action ......................................................24
5.5.2. Establishment of the PATTEC Co-ordination Office .........................................24
5.6. Estimated Budget For The PATTEC Co-ordination Office ....................................25

6. CONCLUSIONS ...........................................................................................................26

7. RECOMMENDATIONS .................................................................................................27

ANNEX A ..........................................................................................................................30
  Summary of Presentations

ANNEX B ..........................................................................................................................43
  List of Participants

ANNEX C ..........................................................................................................................45
  Agenda of the Meeting

ANNEX D ..........................................................................................................................47
  Meeting Prospectus and Background Note

ANNEX E ..........................................................................................................................51
  PATTEC Plan of Action (draft)
Background/Justification

The Agency’s objective is to promote the use of nuclear techniques for development purposes. Tsetse eradication is assuming increasing importance within the Region as it has become evident that the tsetse and trypanosomosis is a contributing factor to sustained rural poverty. Feedback from Member States and the international community has shown growing interest in the role of the Sterile Insect Technique (SIT) as the only proven technique for eradicating tsetse from Africa. The adoption of an integrated pest management area-wide approach where conventional methods are used in combination with SIT to eliminate tsetse can have a major impact on socio-economic development by increasing land available for agricultural exploitation as well the accruing benefit of livestock development.

In line with the TC strategy, the thematic plan aims to identify the end-users for the SIT and draw up a strategy for adapting its technical co-operation to produce socio-economic impact through these end-users. Synergies will be sought with the international community, regional organisations and institutions, national counterparts and the private sector in achieving programme objectives.

1. BACKGROUND

IAEA Member States in sub-Saharan Africa include 33 (out of a total of 40) Heavily Indebted Poor Countries (HIPC), which suffer from climatic extremes, widespread disease and food insecurity, often exacerbated by political instability. Trypanosomosis, transmitted by tsetse flies, causes both human and animal diseases on this sub-continent where some 260 million of the world's poorest people are to be found. Recognising the importance of trypanosomosis as a root cause of poverty, the OAU has declared the year 2001 as the year of the control of tsetse fly, to mark the beginning of renewed efforts in the campaign for the eradication of tsetse flies and the problems they sustain in Africa.

Substantial literature exists documenting the extent and magnitude of the tsetse problem in agricultural terms. The clinical disease in livestock is a major impediment to livestock production in most of the 37 tsetse infested countries in sub-Saharan Africa but this is only part of the problem. The uneven distribution of livestock restricted by the tsetse belts, the inability of farmers to use draught animals in crop production, the distorted land utilisation and settlement pattern in high tsetse infested areas, all severely constrain agricultural and rural development.

Economic impact assessments of African animal trypanosomosis suggest annual losses amounting to several billion US$ (World Bank, FAO, PAAT, ILRI). When held against the total livestock GDP in sub-Saharan Africa, tsetse and trypanosomosis induced losses equate to 20-25% of the total production volume. No other animal health problem of this magnitude is encountered in developing countries. Furthermore, these economic figures do not reflect the human dimension or the way tsetse and trypanosomes affect the livelihood of rural societies. Livestock in developing countries have an important role in ploughing and traction. OIE estimates that 50% of all crop production across Asia is realised through the use of draught animal power. In sub-Saharan Africa this percentage is in the region of 5-10% (PAAT-IS data) and the number of draught oxen available to plough the fields for crop production in sub-humid and semi-arid sub-Saharan Africa is critically low.

To further exacerbate these depressing statistics there is every possibility that tsetse distributions may expand as a result of global warming. Tsetse distributions in Ethiopia are dictated by low temperatures but they are already expanding. In recent years there has been progressive fly incursion in the western and southern parts of the country from heavily infested lowland areas into the highland shoulders of the highly productive central plateau. This has resulted in cattle deaths in areas where the inhabitants never experienced animal trypanosomosis before, reduced crop hectarage and the evacuation of farming communities into already overcrowded but tsetse-free highland areas. Abandonment of the tsetse areas ultimately sees the fallow land return to bush, which is suitable fly habitat and thus creates a vicious circle.

Human African Trypanosomosis (sleeping sickness), affects countries in all regions of the sub-continent but after a decline which saw it almost disappear in the 1960s it is once again reaching epidemic proportions in Angola, Congo D.R. and Sudan. Sleeping sickness affects mainly marginal rural communities already disadvantaged by lack of infrastructure, services, clinics, schools or political stability. The absence of effective governance and the associated problems of civil strife are key factors in the resurgence of sleeping sickness. The displacement of people increases exposure in historical disease foci and coupled with the general lack of medical services and health care, a situation is created in which newly infected persons become the primary disease reservoir thus accelerating transmission.

Some 500,000 rural people, including many children, are believed to carry pathogenic trypanosomes and without treatment many will die. The negative impact of tsetse and trypanosomosis on the health and vulnerability of poverty-stricken rural Africa goes beyond the realms of economic interpretation. Given that people across sub-Saharan Africa are affected, that the problem impinges on the rural livelihood of 250-300 million people, it follows that the control of tsetse and trypanosomosis, ranks with or exceeds the control of HIV/AIDS and malaria as a prerequisite to improved livelihoods and both human and animal welfare.

Africa is not without international support and throughout the 20th Century enormous effort has been expended on research and control to alleviate the problems caused by human and animal trypanosomoses. Latterly there has been an unfortunate strategic shift as the lack of sustainable progress from expensive, large scale campaigns has promoted the concept of community participation - which encourages rural communities to 'live with' the disease. Over the same time span, tsetse distributions have increased and, indeed, have led to both the OAU declaration and increasing acceptance that there is again an urgent need for large-scale intervention. That is not to say that communities cannot contribute to the OAU campaign to eradicate tsetse. They can and they must since sustainable control will only be achieved if the solutions are owned and implemented by those directly affected. The dilemma is that poor farmers can not afford the cost of control - but nor can they afford to remain aid dependent. The IAEA can contribute to area-wide control but the eradication of tsetse from Africa will require much more. It will only be achieved if the UN Agencies and other international institutions work in partnership with and in response to the demands of national institutions and civil society at all levels. To facilitate this, rural communities will need incentives to play their part and it is perhaps relevant to quote Kofi Annan who made the point that US$12billion p.a. of international aid to Africa continues to largely finance expatriate assistance!

Thus the IAEA convened a meeting in February 2001 to seek advice from a panel of experts to align the IAEA’s Sterile Insect Technique (SIT) Programme and related activities with PATTEC’s plan of action and set priorities for its effective integration into area-wide
campaigns to create sustainable tsetse-free zones in sub-Saharan Africa. The experts were also tasked to deliberate and come up with recommendations on the most effective and efficient way for the Agency to provide assistance to its Member States in addressing the tsetse and trypanosomosis challenge.

This document provides strategic guidance and direction on how and where the Sterile Insect Technique (SIT) can be most efficiently and effectively applied to control and ultimately eradicate the tsetse fly.

2. CONTEXT

2.1. Development Need

The tsetse and trypanosomosis problem is characterised by many interdependencies involving agro-economical, social and environmental issues. Any intervention (or non-intervention) will have a wide range of immediate and longer-term implications.

In the 36 tsetse-infested countries of Africa, close to 50 million cattle and tens of millions of small ruminants are at risk from trypanosomosis. Direct losses in meat production and milk yield and the costs of programs which attempt to control trypanosomosis are estimated to amount to between US$ 0.6 and 1.2 billion each year (FAO, 1994). If the cost of lost potential in livestock and crop production is included, trypanosomosis is estimated to cost the sub-Saharan Africa US$ 4 billion or more each year, one fourth of the total livestock produce in the area (FAO, 1994). According to the World Health Organisation, over 55 million people living in rural areas of sub-Saharan Africa are at risk of human trypanosomosis (sleeping sickness). Some 30 000 new cases were reported in 1996, however this does not reflect the real epidemiological situation, but simply poor surveillance. The estimated number of infected persons is over 300 000 (WHO, 1998). With further population increases, these losses and the resultant poverty and political instability that will inevitably follow will also increase and seriously curtail opportunities for development.

In most African countries the demographic developments demand more productive agricultural systems, but over the years the tsetse / trypanosomosis problem appears to have grown worse. In spite of tsetse control operations the reduced vector populations can still be very efficient transmitters of trypanosomes and some intervention measures have undesirable side effects. Trypanosomes have developed resistance and cross-resistance to various available trypanocides. The extensive use of insecticides on cattle for tsetse control appears to interfere with the zootic stability / immunity of cattle to several tick borne diseases, thus long-term tsetse control may enhance other secondary problems. Tsetse flies continue to invade previously uninfected agricultural areas and further decrease the area of land available for high productive agricultural systems.

Unlike Asia, Europe and the Americas (where tsetse flies do not exist), crop farming and livestock production in sub-Saharan Africa are largely separated due to the presence of tsetse flies. In this region, humans - mainly women - are the beasts of burden; the hoe stands in for the plough, and the head for the horse’s back. The consequences of tilling the land by hand and trudging long distances on foot; the absence of mixed farming, limiting the availability of animal protein and manure; the ever impending threat and prospect of disease and death; the futility of working barren soils and herding unproductive livestock, and the combined effect of
all this on the history and socio-economic development of the African people is difficult to exaggerate. The limitations imposed by the tsetse and trypanosomosis problem continue to frustrate efforts and hamper progress in crop and livestock production, thereby contributing to hunger, poverty and suffering to entire communities in Africa. It is estimated that if draught animals are available, one family can increase its agricultural productivity by at least 10 times, if compared to its present dependence on manual labour alone.

The potential of several available intervention methods and of new supportive technologies has not been sufficiently explored. This is particularly the case for the Sterile Insect Technique (SIT), which, contrary to other "conventional" methods of tsetse control, has a unique efficiency pattern i.e., increasing efficiency with decreasing target pest population density. A phased and complementary use of both "conventional" methods and the SIT will have maximum efficiency throughout the intervention campaign.

### 2.2. Setting the Context of Trypanosomosis and Tsetse Eradication by Means of Area-Wide Interventions

Presentations were given by the meeting participants to provide the background and context for the meeting. Summaries of the individual presentations are included in Annex A (page 30)

**Thematic planning**

Through the joint IAEA/FAO Division, the two organisation bring their comparative advantages to bear in providing assistance to Member States. IAEA through CRP’s and its Laboratory at Seibersdorf ensure that the knowledge and technologies which emerge are rigorously assessed while FAO with its broader mandate, network of offices in the regions and its contacts with the Ministries of Agriculture, is well placed to provide member countries with the much needed multidisciplinary and inter-sectoral perspectives to development issues, policies and the role of technology.

These normative functions however, cannot stand alone. IAEA’s Technical Co-operation Strategy of Thematic Planning serves as a tool for implementing, assessing and validating these normative functions in a tangible way. Thematic planning is a mechanism that outlines strategies of how to translate the link between a subject/topic and the best practices of nuclear science and technology to provide a single sustainable solution. The output is a workplan outlining objectives, time frames, roles, responsibilities and the expected outcome.

Thematic planning is important as a management tool because:

- It seeks to combine several themes into a unified approach for addressing a problem providing for more efficient use of resources.
- It identifies the key problem and selects the best solution possible from lessons learnt and best practices.
- Its a process which generates new knowledge for future programming.
- It promotes dialogue ensuring greater commitment and ownership.
Development of tsetse control

Efforts to control tsetse date back to the early years of the 20th century. The first efforts were based on the removal of habitat and host animals, and fencing to prevent contact between cattle and wild animals. With the discovery of the synthetic organochlorine insecticides spraying for tsetse control became feasible, and large ground spraying operations were conducted in the 1950's and 60's with considerable success. During this period the technique was refined from blanket spraying of habitat to discriminatory spraying of specific tsetse resting sites, principally to reduce costs, but latterly by an increasing awareness of environmental issues. At the same time non-residual aerial spraying using sequential applications of non-persistent chemicals was developed and also proved highly effective.

The rise of the environmental movement in the developed countries resulted in a rapid withdrawing of donor support for extensive insecticide application. Work in West Africa and later in Zimbabwe and Kenya on improved trapping and attractants for tsetse, opened the way for the development of the “bait technologies” for tsetse control, the use of traps or insecticide impregnated screens, with or without attractant odours or insecticide treated cattle. These have now been deployed widely, but success has been very variable depending on many complicated factors, including the level of external support. Other technologies that have been investigated include repellents, chemosterilants, parasitoids and various pathogens, but none has yet been used in large scale control operations.

The variability of results with the bait technologies has resulted in little or no progress being achieved in the last 20 years, and in many areas tsetse are spreading. The poor results stem from logistical and financial problems, compounded by the fact that these technologies often do not lead to eradication, so that reinvasion quickly occurs once control efforts are relaxed.

The sterile insect technique, developed originally for screwworm control in the USA in the 1950's and later for fruit flies, tsetse and other insects, is an ideal technology to integrate with most of the previous techniques in order to reach eradication, and therefore a sustainable position.

Recent research also indicates that tsetse populations are coming under pressure from human activities. For the savannah and forest groups, it can be expected that expanded human activity, particularly agriculture, in the next 50 years will substantially reduce tsetse populations, but there is contrary evidence for the riverine species suggesting that they will prosper with expanded agricultural activity. And it would be unacceptable in the face of the current human sleeping sickness epidemic and widespread rural poverty to abandon tsetse control efforts now in the expectation of reduced populations in 50 years time.

Tsetse challenge of Human African Trypanosomosis (HAT)

The last two decades have witnessed a resurgence in sleeping sickness in nearly all 36 countries where it is endemic, with near-epidemic levels in Sudan, Angola and the Federal Republic of Congo. With an estimated 350,000-400,000 people infected and another 3-4 million people under surveillance, the impact of HAT ranks alongside that of AIDS and Malaria. Some causal factors include scarcity and high price of drugs, treatment failures and drug resistance, and treatment centres that do not have adequate resources.
In April 1999, the World Health Organisation (WHO) established a Regional Treatment and Drug Resistance Network within the framework of national programmes to collaborate with NGOs and the private sector in monitoring drug resistance and recommend solutions for the treatment of sleeping sickness.

**Concepts of Tsetse-Free Zones**

The concept of creating tsetse free zones, which builds upon the integrated pest management strategy (IPM), proposes a “rolling-up” approach of eliminating pockets of tsetse one at a time until an entire area is free of tsetse. Ideally, conventional control methods are applied to an area to eliminate up to 99% of the pest and the Sterile Insect Technique (SIT) is then used to “mop-up” the remaining flies to ensure that no survivors are left. Area-wide tsetse intervention does not have to be a large scale operation and can be applied at community level provided the entire pest population is targeted.

**Trypanotolerance, vaccine development**

Due to increasing evidence of trypanocide resistance from Ethiopia, Uganda, Burkina Faso, Zambia and Kenya trypanocidal drug development is being replaced by the selective breeding of trypanotolerant cattle to enhance the economically important traits of livestock and disease tolerance/resistance traits. Existing trypanotolerant breeds often have lower productivity than other breeds, and tolerance breaks down under high challenge. The trypanotolerance traits are lost when the animals are outcrossed to high productivity imported breeds.

Despite more than 25 years work, prospects for a vaccine remain poor because of the ability of the trypanosome to change the antigenic nature of its cell coat.

**Use of the Sequential Aerosol Technique (Aerial Spraying) in Integrated Area-Wide Tsetse Intervention Campaigns**

SAT applies a sequence of non-residual, low-dosage insecticide aerosols to tsetse populations, usually from low-lying, fixed-wing aircraft. New developments in navigation avionics (differential GPS) keeps the aircraft accurately on course for up to 100km, then facilitates a return on a parallel, reciprocal heading offset by only 250m. SAT is particularly suited to difficult situations such as epidemics, where urgent resettlement follows civil unrest, access is difficult, dangerous (e.g. mined areas) or undesirable (wildlife habitat where access roads can be used by poachers). It does not disturb the natural habitat or require the creation of road networks, nor does it leave control materials as ‘litter’ in wilderness areas and generally has no irreversible effects on non-target species. The insecticide remains in the terrestrial environment for a few hours at most and a few days in water.

Recent trials in the Okavango Delta in Botswana led to a 99% elimination of tsetse but as SAT is not an eradication tool, it is anticipated that SIT will be implemented to target the residual population.
Use of Bait Techniques (Traps and Targets) in Community-Based and Large Scale Intervention Programmes

Experiences from Vavoua (Côte d’Ivoire), Busoga (Uganda) and Nguruman (Kenya) indicate that communities can be effective in the suppression of a tsetse fly population within a limited environment.

The biggest constraint to success is sustainability particularly if results are slow or in the event of recurrences. Individuals are motivated depending on what is perceived as private benefits rather than for the public good. Individuals with no livestock, for example, have no motivation to contribute time or resources. Other problems identified include theft of targets and traps, communities may be too poor to buy the traps and the constant need for sustained supervision and management to ensure that communities are kept abreast with technological developments in the use of insecticides and their possible side-effects.

Community-based programmes should take the lack of resources and local poverty level into account in the design of projects, the formation of inter-community technical teams where barriers are required and the need to develop simple traps and targets that do not require high maintenance.

Environmental Impacts of Insecticide Technologies

Although effective and cheap, one of the most contentious issues associated with the control of trypanosomosis is the use of insecticides through ground and aerial spraying, pour-ons, targets and traps etc. Two major concerns which are the impact of insecticide on non-target species such as wildlife, reptiles, birds, insects and fish and secondly on flora due to a decline in pollinating agents. There is also a need to train communities on the management of pesticide impregnated targets, proper storage and disposal of pesticide containers.

The application of science has significantly reduced impacts on the environment for example, the introduction of sequential aerial spraying (SAT), which, replaced the highly persistent OCs with the less-persistent endosulfan has dramatically reduced the side effects on non-target fauna while the addition of strips of insecticide treated material or chemical attractants has also greatly improved the efficiency of traps and targets.

Best Practices in Large Scale Interventions

Important lessons can be learnt by examining the successes and failures of other large scale animal disease control programmes. The Pan African Rinderpest Campaign (PARC) launched in 1986 in Addis Ababa and later replaced by the Pan African Programme for the Control of Epizootics (PACE) has the two major objectives of eradicating Rinderpest from the African continent and improving animal health services. The programme supported by FAO’s Global Rinderpest Eradication Programme (GREP) collaborates with national, regional and other international organisations to provide a forum for co-ordinating activities and technical support.

Relevant lessons for the tsetse fly eradication programmes include:

- The programme should be technically feasible drawing on existing plausible and proven technology rather than requiring new innovations or research.
• Success is greater if efforts are aimed at addressing one causative organism, using a single vaccine and seeking lifelong immunity.

• A single approach that outlines a common purpose should be used in all countries - an internationally developed and agreed upon plan.

• Impact on the environment should be considered.

• Need for total commitment from the OAU, member governments and other key stakeholders such as UN agencies, World Bank and donor governments with a focus on technical rather than political/administrative/economic issues.

• As much as possible, the agenda should be linked to other regional issues such as structural adjustment programmes and privatisation rather than addressed in isolation.

• As many sources of funding as possible should be identified to avoid a resource crunch as in the case of PARC where actual cost exceeded the estimated cost by 800 million ECU.

• Funding should be channelled through one regional institution with technical expertise rather than political interest. Funding should also be linked to national projects with adequate resources.

• Time is an important element to avoid donor fatigue.

Tsetse/Trypanosomosis Control Programme in Botswana

During the last 8 years, the tsetse infested areas in Botswana have increased from 5,000 to 12,000 km² and more than 300 cattle died in the first outbreak of nagana in more than 10 years. Subsequently, the Government approved and adopted a 3-phased tsetse and trypanosomosis control strategy: chemoprophylaxis, tsetse suppression with SAT and eradication with SIT. Phase 1 was completed and half of the area to be covered in Phase 2 has been successfully sprayed with the last fly caught in August 2001. Part 2 will take place in June-September 2002 in an area of about 8560km². A small field insectary will be established in Kasane, Botswana in order to increase pupae production and initiate tsetse mass rearing for Phase 3 which is the application of the SIT technique.

Tsetse/Trypanosomosis Control Programme in Ethiopia

In 1997/98 the Southern Rift Valley of Ethiopia Tsetse Eradication Project was started in an area which although isolated, has great agricultural potential. A small field insectary was established in Arba Minch while Kaliti near Addis Ababa was identified as the site for the main insectary. In 1999 and 2000, the collection of entomological and veterinary data in the target area was completed and suppression of the tsetse population by use of insecticide impregnated traps and targets initiated. This will be followed by a phased activity approach where the project area is divided into blocks where natural and artificial barriers are used to prevent re-infestation. The consultatory process is a key feature of this programme.

IAEA-OAU Co-operation

OAU-IAEA co-operation will be channelled through support to PATTEC in establishing an office, providing technology transfer, training and technical backstopping for projects using the SIT and in close collaboration with the national governments and other partners, including the
private sector, support PATTEC to assume a leading role of developing specific plans for area-wide tsetse eradication, starting with areas as specified.

Also of great importance in the OAU-IAEA collaboration is the role that the Agency can play in strengthening alliances already established with OAU/PATTEC, WHO, FAO, other UN organisations, CGIAR research organisations, ISCTRC and OIE. IAEA will also endeavour to pro-actively widen the moral and financial support base for the PATTEC activities with the international lending institutions, NGOs and governmental and independent donor organisations.

**Pan African Tsetse and Trypanosomosis Eradication Campaign (PATTEC) Plan of Action**

The Pan African Tsetse and Trypanosomosis Eradication Campaign (PATTEC) is a multi-stakeholder programme initiated by African countries with the goal of eradicating tsetse and trypanosomosis from the continent through a concerted effort of phased, systematic and sustained action using proven techniques and technologies such as SIT for an efficient and effective campaign that is both environmentally appropriate and sustainable.

PATTEC will endeavour to ensure that major disparities in operational capacities between the countries involved are addressed and that the necessary tsetse and trypanosomosis policies are formulated and harmonised. Efforts will also be made to identify, integrate and harmonise existing or planned tsetse and trypanosomosis programmes with rural development schemes as well as the detection and treatment of sleeping sickness.

The PATTEC initiative which is organised as a special independent programme under the Secretary General will be set up within the Inter-African Bureau for Animal Resources (OAU/IBAR).

**The SIT Forum**

The Pan African Forum for the Development and Application of the Sterile Insect Technique (SIT Forum) was established by the OAU in 2000 to facilitate the sharing and exchange of information, experiences and technical know-how in the development and implementation of the SIT in member states. Its main functions will include mobilising African states, design of an operational framework for tsetse eradication using SIT and the mobilisation of material, financial and human resources required for a tsetse SIT.

**Recent Developments**

**The problem**

Donors have little success from which to draw encouragement after a century of support to research and control considering that human and animal tryps are on the increase and tsetse populations are at least as extensive as they were during the first decades following the rinderpest pandemic at the turn to the 19th century.

They are cautious about the technical and economic feasibility, the logistics and the environmental impact of area-wide control which they perceive as a conglomeration of methods which have not achieved sustainable results as sole techniques. They are concerned
about the availability of funding for area-wide control and the possibility that they will be expected to engage in open-ended financial support.

They are concerned about the lack of substantive evidence that the countries of Africa will be able to maintain the political impetus for a co-ordinated effort on the scale and for the time period required to implement the programme proposed by the OAU in their Lomé Declaration.

The solution

Of the poor in Sub-Saharan Africa, 75% live in rural areas and 95% of them depend on agriculture for their livelihoods, many of whom are trapped in a self-perpetuating cycle of malnutrition, low productivity and poverty. The integration of livestock as draft animals and crops seems to be the main resolution for improved, sustainable agricultural systems but this increase is prevented by the presence of tsetse fly and trypanosomosis. The eradication of tsetse would be a major step in the sustainable elimination of hunger from the continent. A trial project of an area-wide IPM Programme that included SIT resulted in the eradication of tsetse from Zanzibar Island. The socio-economic benefits that have accrued since the last wild tsetse was trapped 5 years ago are ample evidence of the enormous impact of a continent-wide eradication of the fly. In a recent report to the Economic and Social Council of the United Nations (ECOSOC), UN-Secretary General Kofi Annan stated in the context of Food security and increasing productivity in agriculture that “The work being done by IAEA and FAO to create Tsetse-free zones in sub-Saharan Africa is also making an important contribution to increasing agricultural productivity in rural areas.” He continued by highlighting that “Support to control this vector (the tsetse fly), found only in Africa, would be a useful contribution to reducing rural poverty.”

The PATTEC initiative is indicative of the importance that African Nations have given to the eradication of the tsetse fly from the continent. It shows the determination of the Africans, as the problem holders, in taking the lead and ownership of the initiative both at political and technical level. The PATTEC plan of action was endorsed at the Lusaka OAU Summit in July 2001 and PATTEC officially launched at the 26th Meeting of the International Scientific Council for Trypanosomiasis Research and Control (ISCTRC) held in October 2001. The Programme Against African Trypanosomiasis (PAAT) formed five years ago as a forum for IAEA/FAO/WHO collaboration with concerned research institutions such as ILRI, ICIPE, CIRDES and ITC will provide international expertise as well as assist in resource mobilisation.

3. STRATEGIC ROLE OF NUCLEAR TECHNOLOGY

3.1. The Sterile Insect Technique (SIT)
Since the 1950’s it is known that insect pests can be controlled or eradicated through a “birth control” method based on genetic manipulation known as auticidal pest control or SIT. The technique involves the colonisation and mass rearing of target pest species, sterilisation of males by exposing the insects to a specific dose of gamma radiation emitted from radioisotopes (Cobalt 60 or Caesium 137) and then sustained, systematic releases of sterile males among the indigenous target population causing infertility in the female. Over time, the fertile population and the reproductive capacity is progressively reduced until fertile matings do not occur and the population is eliminated. The validity of this method has been demonstrated for many insect
pests including screwworms in the Caribbean, South America and the Middle East, the Mediterranean Fruitfly in the USA and Central Europe and tsetse in Zanzibar.

SIT is not a stand-alone technique. To be effective it should be integrated with other techniques as part of an integrated pest management strategy such as the use of odour-baited traps and targets, pour-ons, ground and aerial spraying etc.

One of the driving forces behind the increasing popularity of SIT is the growing concern for protecting and preserving the environment. Use of SIT could significantly reduce the current usage of pesticides and insecticides which sometimes leak into the soil and water bodies and are known to have undesirable impacts on non-target species. Undoubtedly the initial cost outlay of SIT is very high but the cost-benefit ratio over an extended period, say 25 years, is significantly lower than use of pesticides or other control mechanisms.

3.1.1. Attributes of SIT

SIT has special attributes which make it a unique insect pest management tool:

- **Species specificity**: SIT represents a biologically-based tool directed exclusively at the target species, thereby controlling only the pest populations without any adverse impact on non-target organisms.

- **Inverse density-dependence**: SIT has the unique attribute of increased efficiency with decreasing target population density - the sterile males have the ability to find the last wild females in the whole area.

- **Compatibility for integration**: SIT can be effectively integrated with other methods including biological methods, such as parasitoids, predators and insect pathogens giving a totally biological systems for managing some of the world's most important insect pests.

3.1.2. Justification

The logistical challenges of an SIT operation are considerable but manageable and as indicated below, there are several very real opportunities where an SIT component as part of an integrated area-wide campaign appears feasible and justifiable. An area-wide approach should be considered if it increases the efficiency of conventional control, limits undesirable environmental side effects and limits the potential for development of resistance to trypanocides and insecticides. Tsetse SIT would be a useful complement to such an approach particularly under the following circumstances:

- The target population is isolated in ecological islands as confirmed by population genetic studies.
- There is evidence for tsetse and trypanosomosis advancing into new, previously uninfested agricultural areas.
- Demographic development demands the introduction of highly productive livestock systems for which tsetse / trypanosomosis control is simply not good enough and eradication of the problem is advised.
- Recurrent expenditures for continuous tsetse / trypanosomosis control are not acceptable.
- Tsetse infested wildlife reserves and agricultural areas are in close neighbourhood and pose a threat to each other.
• Although continuous operations throughout the year would technically be advantageous, the control area can (temporarily) not be accessed and there is evidence that aerial releases of sterile tsetse are advantageous.

• There is environmentally detrimental, uneven distribution of cattle and signs of overgrazing in areas not far away from tsetse infested areas.

3.2. Feasibility Considerations

3.2.1. Technical Considerations

Mass Rearing

In tsetse fly rearing, only the pupal and adult stages have to be considered as the more delicate egg and larval stages remain within the pregnant female fly and do not have to be fed. Adult tsetse flies do not require water or carbohydrates, only quality blood. Animal blood for tsetse rearing can be collected at a local abattoir and then treated with gamma radiation to eliminate any micro-organisms, and can be fed to flies through a membrane feeding system.

Low Productivity of the Tsetse

Another important biological factor is the low reproductive rate of the tsetse fly. A wild population of tsetse flies, suppressed by conventional methods and then subjected to continuous overflooding with sterile flies, has a small probability to recover because surviving fertile females can only produce one offspring every 9-10 days and the generation time is two months. This also means that temporary upsets in sterile fly quality, quantity or distribution have less of a negative impact on the outcome of any activity.

Low Risk of Tsetse Re-infestation

The most important biological characteristic of the tsetse fly is its inability to disperse rapidly and actively from one area to another. It has been calculated that the straight line distance travelled in the life span of a tsetse fly is less than 1.71 km from its birth place and the estimated spread distance for tsetse populations 18.7 km over a 10 year period. The erection of effective (temporary) barrier zones such as cleared land or impregnated target barriers can effectively mitigate re-invasion. Passive transport of individual adults in cars or by wild animals should be taken into consideration.

3.2.2. Economic Considerations

The most persistent argument made against the use of the SIT to eradicate the tsetse fly from strategic areas in Africa is the claim that it is not "cost effective." A group of experts convened by the FAO in 1988 agreed that the technique might be cost effective provided that the scale of the operation was at least 20,000 km². Obviously, any major campaign in Africa, irrespective of the technique used for control or eradication would need to be on this scale and would be expensive.

However, the obvious imbalance between annual investments of approximately US$ 100 million to US$ 200 million for tsetse and trypanosomosis research and control, estimated direct losses of between US$ 600 million and US$ 1,200 million per year and indirect losses that may be ten times this amount annually in terms of reduced productivity of the animals and humans who contract trypanosomosis need to be considered in a cost/benefit analysis. Other costs not usually accounted for, include the environmental side effects of continuous tsetse control or the interference with the enzootic stability to various tick borne diseases.
Comparing the recurrent investments for continuous control and the additional investments needed for a complementary tsetse SIT eradication campaign, it is obvious that the eradication effort only requires the availability of a few years’ control budgets at once. During the period 1987 and 1991, the cost of tsetse control using insecticide impregnated targets in Zimbabwe was estimated at approximately US$ 100 (i.e. Z$ 600 at that time). The maintenance of the status quo of tsetse / trypanosomosis control in the Okavango Delta of Botswana requires a recurrent expenditure in excess of US$ 1.5 million, although there were no cases of sleeping sickness or nagana in Botswana since the mid 1980s. The treated area comprises up to 6,000 km$^2$ and the cost for target placements as implemented in Botswana, therefore, amounts to at least US$ 250 per km$^2$. The implementation of an SIT component for tsetse eradication needs an investment over 18 months equals to 3.2 to 8 years recurrent expenditures for tsetse control. This calculation does not consider the additional benefits accruing from an eradication status, such as significant increases in livestock productivity due to the introduction of crossbred cattle.

Economies of scale, the commercialisation of various aspects of the fly production (for example the local collection and processing of abattoir blood as standard diet for tsetse), the ongoing development and refinement of methods that are partially already in use and economising the aerial dispersal of sterile males according to habitats and actually required sterile male densities or ratios in relation to relic wild flies will further reduce the cost of the SIT package.

Moreover, in tsetse / trypanosomosis intervention areas that experience civil unrest as in some of the countries within the tsetse belt, an SIT component (the release aircraft can fly sufficiently high) may be the only safe option for sustaining a certain level of control and preventing the escalation of endemic animal and human trypanosomosis until conventional intervention can be resumed.

3.2.3. Political Considerations

The trans-boundary nature of tsetse fly infestations across national boundaries and the strategic objective of eliminating the tsetse population infesting a particular area make the area-wide approach necessary. The success of any such undertaking, involving different countries, would be predicated on efficient mechanisms of co-ordination and co-operation between and among the affected countries. The development of one centrally co-ordinated continental programme, such as is envisaged and advocated by PATTEC, will facilitate this possibility and enhance the management of area-wide approaches. Furthermore, the mandate extended to the OAU Secretary General by the Heads of State and the framework provided under the terms of inter-country agreements witnessed by the OAU will provide the necessary operational environment. The severity of the tsetse and trypanosomosis problem; the availability of human, financial and material resources for an eradication effort; and the availability of data and information required to carry out an eradication campaign, all vary between different countries. As much as possible, the approach be regional rather than national.

4. ROLE OF THE IAEA AND THE JOINT FAO/IAEA DIVISION

IAEA through its Technical Co-operation Division and its Joint FAO/IAEA Division have played a central role throughout the development and successful implementation of the sterile
insect technique for fruit flies and other key insect pests and are expected to play a similar role in a programme targeting the tsetse fly.

The IAEA and FAO assists Member States through Country Programme Frameworks to identify the need for, develop and implement SIT programs through support to:

- Determine if an SIT program is justified on economic and environmental grounds.
- Obtain technical base-line data required to implement a field program, including support to the collection of ecological, seasonal and distribution data, as well as whether pest population levels are suitable for SIT, or require previous suppression as part of an integrated area-wide approach.
- Identify and provide the R & D support required to backstop a successful field program.
- Assist in development of the required infrastructure, including training in genetic molecular and GIS methods, mass rearing facilities, research laboratories etc.
- Assist in design and implementation of national public information campaign to obtain public support for area-wide activities that will address the insect problem.
- Assist in developing the capacity for mass production of sterile insects, and encourage commercialization of production and other activities related to SIT application.

5. PROGRAMME STRATEGY

5.1. Pan African Tsetse and Trypanosomosis Eradication Campaign (PATTEC)

The Pan African Tsetse and Trypanosomosis Eradication Campaign (PATTEC) is a concerted initiative of the OAU Member States, with the declared objective of eradicating tsetse and trypanosomosis from Africa within the shortest time possible. The initiative comprises an international campaign to generate a process of collective, coordinated and sustained action through the introduction of the necessary support and mechanisms required for the eradication of tsetse and trypanosomosis, set against a background of an urgent need to rid Africa of trypanosomosis and all the constraints and suffering it imposes on the continent. Some of the key elements of the proposed programme strategy are:

5.1.1. Phased, area-wide approach

Africa’s tsetse fly belt covers about 10 million km² covering 36 Sub-Saharan countries and comprises over thirty species and sub-species of tsetse flies that inhabit different habitats or ecological zones.

The eradication of the entire tsetse fly belt will be a long-term undertaking executed through a phased, systematic and sustained campaign starting with individual zones of infestation and creating an ever-expanding tsetse-free area, until the entire Region is tsetse-free.

Past experiences of re-infestation has either arisen from relic populations of flies that survive control operations or emanated from flies that invaded the control area from neighbouring areas. To achieve sustainable eradication the strategy advocated by the PATTEC initiative involves the identification of zones of infestation which are isolated, physically e.g. by mountains, water bodies, etc. or by limitations in factors connected with preference and tolerance limits of the fly, e.g. food availability, temperature, humidity, natural cover, etc. or
where the fly population isolation can be achieved by artificial means. Each area will be tackled and once rendered tsetse-free, barriers will be set up to prevent re-infestation.

The trans-boundary nature of tsetse fly infestations across national boundaries and the strategic objective of eliminating the tsetse population infesting a particular area make the area-wide approach necessary. The success of any such undertaking, involving different countries, would be predicated on efficient mechanisms of co-ordination and co-operation between and among the affected countries. The development of one centrally co-ordinated continental programme, such as is envisaged and advocated by PATTEC, will facilitate this possibility and enhance the management of area-wide approaches. Further, the mandate extended to the OAU Secretary General by the Heads of State and the framework provided under the terms of inter-country agreements witnessed by the OAU will provide the necessary operational environment.

The selection of a particular area for the tsetse eradication campaign will be based on considerations of various criteria that will be established. The criteria will, among others, include: the diversity of tsetse species inhabiting the area, the degree of isolation of tsetse fly population(s), the ease of eradication of the species, and the socio-economic importance of the area(s) being considered.

5.1.2. Co-ordinated action.

The tsetse eradication efforts of any two or more African member states that share contiguous tsetse infested areas will be conducted jointly and concurrently. The PATTEC Office will encourage the initiation of tsetse eradication projects and help mediate between affected countries in inter-country meetings and consultations to determine the modalities of co-operation in joint projects. Relevant national offices and focal points will be identified to support the effort.

While the management or sponsorship of projects in countries sharing a common tsetse fly belt may be separate and unilateral, the planning and execution of tsetse eradication projects shall be done jointly, in a process centrally co-ordinated by PATTEC.

The PATTEC Co-ordination Office will also ensure that all major disparities in operational capacities between the countries involved are addressed and that the necessary tsetse and trypanosomosis policies are formulated and harmonised.

5.1.3. Results-oriented

The sub-programmes within the PATTEC initiative will be results oriented; the primary objective and final outcome of any PATTEC project will be the elimination of trypanosomosis through tsetse eradication. During the initiation and approval of a PATTEC project, therefore, emphasis will be put on the establishment of clear and realistic goals as well as the identification of measurable indicators of success. Such projects will also ensure that the various stages of each project are closely aligned from the beginning to the end to maximise efficiency, avoid stoppages and ensure sustained progress towards the achievement of the desired objective.

The implementation of PATTEC projects will be dynamic so as to allow flexible and responsive planning. Continuous reviews and adoption of appropriate technologies and approaches in responsive action will be undertaken, based on the results of regular monitoring and evaluation of ongoing projects.
5.1.4. Use of appropriate technologies and approaches

Experience has shown that no one single technology or approach will result in the eradication of tsetse flies from an area. PATTEC will, therefore, follow an integrated approach and use appropriate combinations of available technologies in the tsetse eradication effort.

Within the context of the PATTEC initiative, efforts will be made to identify, integrate and harmonise existing or planned tsetse and trypanosomiasis control and eradication programmes as well as related rural development schemes that add value to or are enhanced by PATTEC activities. This will include the promotion of agricultural development in suitable areas, the linking of ongoing and planned projects with PATTEC, the detection and treatment of trypanosomiasis, and the provision of support for the development and application of appropriate conventional and new technologies for tsetse population control, barriers establishment and management, etc.

5.1.5. Ecologically-sensitive approach

The activities of PATTEC will need to be supported with appropriate research inputs. This will be achieved through the establishment of a data management unit and the collection, storage, analysis and dissemination of relevant data and information on research results. The active involvement of African institutions in solving identified research problems will be actively promoted and effective links with international institutions will be encouraged.

PATTEC will follow an environment-friendly approach. The choice of the intervention methods to be used in the tsetse eradication projects will be based on considerations of their direct and indirect impact on the environment as well as on their cost benefit analysis. Efforts will also be made to develop and encourage land use policies and plans for operational areas to prevent adverse environment effects of post eradication activities. Indicators of adverse environmental changes will be identified during the monitoring and evaluation of environmental changes. PATTEC will ensure that environmental agencies and other concerned environmental stakeholders are consulted and involved in all environmental issues connected with the tsetse and trypanosomiasis eradication activities. Every tsetse eradication project will undergo an appropriate Environmental Impact Assessment (EIA) before it is started, and environmental monitoring procedures will be performed during project implementation.

5.1.6. Participation

PATTEC will adopt a participatory approach which involves consulting and working with all stakeholders - national governments, civil society, donors, international organisations, regional and national research institutions, academia, the private sector etc. in achieving the objectives set out in the plan of action.

5.1.7. Monitoring and evaluation

PATTEC projects will be monitored and evaluated at national, regional and PATTEC Co-ordination Office level to ensure that the implementation of various activities are timely and appropriate and the desired objectives of the eradication effort are attained. This will be achieved by direct and indirect monitoring and evaluation, with all findings for each project being recorded and reported. The various indicators established during project design and the overall as well the day to day operational plans of the project will be used as yardsticks of performance during the monitoring and evaluation effort.
5.1.8. Training
The PATTEC Co-ordination Office will ensure that all the human resources needed for its activities are available and correctly managed. This will be achieved through the identification of human resource needs, using consultants or experts where necessary, assessing the training needs of appointed staff and identification of mechanisms to recruit and retain trained staff.

5.1.9. Awareness Creation Campaign
The PATTEC Co-ordination Office will conduct an active public relations campaign in order to raise awareness among all stakeholders and the general public. This will be achieved through the establishment of a public relations / communication unit, the production of printed media such as brochures, pamphlets, newsletters, charts and posters; using mass media such as radio, television, website and lobbying governments, donors, independent groups and other stakeholders.

5.1.10. Information Management
The PATTEC Co-ordination Office will be responsible for the collection and dissemination of data and information related to tsetse and trypanosomosis programmes. This will be achieved through the establishment of a GIS based data management unit, standardisation of data collection and management, establishment of a network for information exchange and the establishing and maintaining a Website. Attempts will be made to use existing facilities and build on on-going initiatives, such as PAAT-IS, TTIQ, etc.

5.2. Roles And Partnerships
In keeping with its strategy of participation and consultation, PATTEC will work with the various partners to achieve the following:

5.2.1. National Governments
The direct involvement and participation of National Governments in PATTEC projects will be actively sought through raising their awareness. Consultations and meetings at all levels of government and direct contact with OAU will be arranged and information in form of reports, regular newsletters, brochures, etc. describing the PATTEC initiative and its objectives will be made available. OAU / PATTEC will also approach member countries that intend to / have initiated area-wide tsetse intervention campaigns in agreed priority intervention areas with the aim to specifically include the tsetse / trypanosomosis problem in their national Poverty Reduction Strategic Papers (PRSP). Regular meetings and conferences involving governments and the OAU, such the OAU Summit for the African Heads of State and Government, the Livestock/Agriculture/Health ministers conferences and meetings of the Council of ministers will be used to promote and publicise the PATTEC initiative.

National governments will be involved in the initiation, formulation and approval of new projects in their respective countries, as well as in defining government roles and contributions in national and collaborative projects. Co-ordinating, monitoring and evaluation of project implementation at the national level, will also be the responsibility of national governments. National governments will make human, financial and material resource contributions to PATTEC tsetse eradication projects.
5.2.2. Civil Society

Sustained participation and contribution by communities in areas where PATTEC projects are being undertaken will be ensured through training, motivation mechanisms and awareness raising. Local communities will be encouraged to solicit political support for tsetse eradication initiatives through their political representatives. Local communities will be encouraged to provide material, moral and any other support to PATTEC projects in kind.

5.2.3. Donors

The PATTEC Co-ordination Office will maintain contact with the donor community and seek their interest, participation and support in the programmes of PATTEC. To this end, the overall programme will be divided into small viable project units for funding purposes.

Attempts will be made to explore the donor world and the approaches used to access funding support. The existing OAU liaison structures and appropriate linkages between donors and national governments will be used to convene meetings with donors on a regular basis. Bilateral agreements between governments and donors to support tsetse eradication projects will be sought. The PATTEC Co-ordination Office will also seek donor participation in the PATTEC initiative through the support of identified Patrons, as well as through effective utilisation of the Office of the Secretary General of the OAU.

5.2.4. International Organisations

International Organisations such as FAO, IAEA, WHO and other active role players involved in tsetse and trypanosomiosis control activities are recognised as partners with the OAU and primary stakeholders within the PATTEC initiative. Efforts will be made to ensure the full participation and support by these international organisations in all PATTEC activities. Representatives of these organisations will participate in the Policy and Mobilisation Committee and the Technical Advisory Forum, to ensure that all partners share the task of planning and guiding the activities of the PATTEC Co-ordination Office.

5.2.5. Regional and national research institutions, academia etc.

All other stakeholders will be identified and efforts will be made to integrate and harmonise their inputs and participation in the context of the PATTEC initiative. This will be done by raising their awareness through appropriate Public Relations activities and seeking their direct and indirect involvement in field activities such as extension work, tsetse control and evaluation activities, etc.

5.2.6. Private Sector

Private sector involvement will be encouraged in all aspects of PATTEC. This will be done through efforts to build the capacity of the public sector, e.g. through training, etc. and mechanisms to involve the private sector in PATTEC activities, e.g. through the award of contracts and sub-contracts.

Tenders will be advertised inviting bids from private organisations to be involved in the execution of tsetse eradication projects, or in the provision of certain materials and services connected with the campaign.
5.3. Organization and Operational Structure

5.3.1. The African Heads of State and Government

The ultimate governing body of the PATTEC initiative comprises the OAU Heads of State and Government who made the Decision for Africa to embark on a campaign to eradicate tsetse and trypanosomosis from the continent. The Heads of State and Government will be expected to act collectively to provide the necessary support to the initiative. They will receive a progress report from the OAU Secretary General every year at the OAU Summit meeting, through the current Chairman of the OAU.

5.3.2. The Secretary General of the OAU

The Secretary General of the OAU is the person ultimately responsible for initiating and co-ordinating the tsetse and trypanosomosis eradication campaign. He will make all necessary consultations with all possible partners and seek their support and co-operation in the implementation of the campaign and submit an annual progress report to the OAU Summit through the current Chairman. He will maintain active and regular contact with the PATTEC Co-ordination Office.

5.3.3. Patrons and the Policy and Mobilisation Committee

The Secretary General will identify high profile personalities, who individually or collectively will help to advance the objectives of the PATTEC initiative, through their advice and influence. Particular emphasis will be placed on contact with African governments, donor countries and international development organisations.

5.3.4. The Tsetse and Trypanosomosis Eradication Campaign

The PATTEC initiative will be organised as a special independent OAU programme under the Secretary General. A PATTEC Co-ordination Office to organise and co-ordinate the campaign will be set up within the OAU General Secretariat or at any of the OAU’s organs, such as OAU/IBAR, as may be decided by the Secretary General. The PATTEC Co-ordination Office shall, in exercising its functions, report to the Secretary General. In addition to providing a legal framework to PATTEC, the OAU will also provide the overall policy, administrative and financial guidance and supervision to the PATTEC Co-ordination Office.

The planning, initiation, co-ordination, monitoring and evaluation of the PATTEC programmes, as well as the day to day administrative and technical activities of the Campaign will be the responsibility of the PATTEC Co-ordination Office.

5.3.5. Regional and National Co-ordination Offices

Regional and National PATTEC Co-ordination Offices will be set up, as the need for them arises, to enhance planning, co-ordination, monitoring and evaluation of PATTEC projects at the regional and national levels respectively. Persons to function as Operational Focal Points will be identified, e.g. through nomination by the affected countries. These will be dynamic animators, who will help advance the objectives of the PATTEC initiative and provide the necessary local guidance in the execution of PATTEC activities.

5.3.6. Regional Tsetse Eradication Centres

Two or three centres situated in vantage locations in different regions of Africa will be set up as centres of excellence for the benefit of all Member States. Such centres will, for example, be
involved in the production of sterile male tsetse flies required for release in tsetse eradication programmes; research on pertinent problems by international scientists and experts and training of operational, management and technical personnel from different countries. The centres will be established as facilities of joint investment and will enhance the spirit of collective action, drawing benefit from synergy and avoidance of problems of duplication and economies of scale.

5.3.7. Technical Advisory Forum

The PATTEC Co-ordination Office will have a Technical Advisory Forum composed of representatives of the Pan African SIT Forum, FAO, IAEA, WHO, OAU/IBAR, ISCTRAC, and Program Against African Trypanosomiasis (PAAT). The Technical Forum will, from time to time, review reports and project proposals and advise the PATTEC Co-ordination Office on technical issues. The Pan African SIT Forum will provide a mechanism through which the technical requirements of the campaign are identified and made available to the Member States.

5.4. PATTEC Roles

5.4.1. Identification of Target Areas

The Campaign will start with ongoing and planned eradication projects and proceed to initiate new projects in other priority areas that may be selected. The process of identifying areas and initiating and executing tsetse eradication projects in selected areas will continue in a sustained, systematic manner, each identified isolated area being tackled independently, until all the areas of Africa’s tsetse belt have been covered and tsetse flies are finally eradicated.

Target areas will be identified through the use of geographic information system (GIS) based management of relevant information, such as climate, vegetation, density and distribution of tsetse flies, trypanosomiasis prevalence, agriculture and livestock development potential and other relevant parameters. A continent-wide confirmatory survey to provide the definitive description of the areas of tsetse fly infestation will be undertaken.

5.4.2. Prioritization of Areas

Taking into account, *inter alia*, the following:

- The degree of isolation of tsetse fly populations by natural boundaries or in areas where fly populations can be isolated by artificial means. Where such areas in which the fly population is isolated or can be easily isolated, immediate plans should be put in place for a sustained operation towards eradicating tsetse from adjacent areas.

- National and Regional priorities

- Availability of infrastructure for immediate implementation including human, material and financial resources

- Easily controllable species of tsetse flies (including ease of mass-rearing, availability of means of efficient trapping, etc.)

- Land use pressure.

5.4.3. Project Categorisation for Selection

A clear definition of the projects that need to be considered for implementation under PATTEC will be stated and the criteria for selection clearly outlined.
5.4.4. Project Initiation
Projects will be initiated either through the PATTEC Co-ordination Office or directly by countries, in line with the agreed prioritisation for identified project areas.

PATTEC will facilitate the preparation of project proposals, e.g. through the use of short-term consultancies, with the active involvement of the affected countries.

Projects prepared by countries will be submitted to the PATTEC Co-ordination Office for purposes of record and co-ordination.

5.4.5. Project Support
PATTEC will mobilise resources from national and donor sources to implement eradication programmes. Where regional country groupings e.g. ECOWAS, East African Community, COMESA, IGAD, SADC, etc. exist, attempt will be made to seek their interest and involvement in the planning and initiation of tsetse eradication programmes as development projects. Efforts will be made to persuade the governments of affected countries to include tsetse eradication objectives in their national plans and development strategies. Investment structures and opportunities for post-tsetse eradication development programmes to exploit the use of tsetse-free land will be created and promoted. The assistance of professional companies or experts with experience in the process of fund-raising activities will be sought. A donor’s conference will be called.

5.4.6. Harmonisation of Different Programmes
PATTEC will integrate, at the conceptual level, the on-going tsetse control programmes to enhance the area-wide and emphasise the objective of tsetse eradication. Where countries have already initiated eradication programmes PATTEC will evaluate the projects and where appropriate provide the technical advice required to upgrade or modify the projects to bring their outcome in line with the objectives of PATTEC.

Attempts will be made to ensure that all countries comply with the objectives of the PATTEC initiative. PATTEC will seek authority for the mechanisms necessary to enable the smooth operation in tsetse eradication activities across national boundaries, and provide the facilities for dialogue between countries on tsetse eradication projects.

5.4.7. Project Implementation
PATTEC will facilitate the formation of co-ordination and management structures to oversee the efficient implementation of regional and national programmes. Each project will have an independent management team appointed by the respective country or countries where the project is being undertaken.

5.4.8. Project Appraisal: Monitoring and Evaluation
PATTEC will organise mid-term and end of project evaluations for all PATTEC Regional Programmes. In addition, PATTEC will institute regular monitoring mechanisms with clear indicators, and draw any necessary attention to the report on results found.

5.5. Operational Plans
PATTEC will have annual, short term, medium term and long term plans of operation, developed by appropriate experts or consultants and submitted to the OAU Secretary General,
and through him the Heads of State and Government for approval. The short-term operation plan includes, within its programme early in Year 5, a formal review of the PATTEC progress so far made and the development of a Plan of Action for the next 5 years.

The annual and short-term operational plans of the PATTEC will consist of project activities that have been initiated either by the PATTEC Co-ordination Office or by one or more of the affected Member States.

PATTEC's annual plan of operation for the year 2001 (see Annex E) focuses on strengthening and co-ordinating existing tsetse eradication efforts in East and West Africa in light of the current efforts to eradicate tsetse from the African continent.

5.5.1. Process for the approval of the Plan of Action

This Concept Note and Plan of Action was seen and noted formally noted by the OAU Council of Ministers, during the meeting in Tripoli, Libya (22 - 26 February 2001). The Ministers recommended that the Concept Note and Plan of Action be submitted as part of the Secretary General's report on the progress made in the implementation of the Decision by the Heads of State and Government at the Summit in July 2001, where it was endorsed.

The Concept and Plan of Action was also brought to the attention of the meeting of the OAU Ministers of Agriculture, held in April 2001, as well as to the African Ambassadors and Plenipotentiaries accredited to the OAU, at a special meeting convened during May 2001. Further, copies of the document have been sent to all OAU Member States and to partner international organisations (FAO, IAEA, WHO) for information.

Upon approval by the Heads of State and Government the Plan of Action was published as an OAU document and its requirements included in development plans.

5.5.2. Establishment of the PATTEC Co-ordination Office

The PATTEC Co-ordination Office has temporarily been established at the OAU General Headquarters as a special project under the Secretary General's office. The PATTEC Co-ordination Office will identify focal points within countries, starting with those countries where area-wide tsetse intervention activities will be initiated first. The focal points will enhance the work and process of co-ordinating and implementing projects.

Harmonisation of on-going or planned programmes with the concept and objective of the PATTEC initiative will be done through meetings and consultations between OAU and the management of the projects in question.

Harmonisation will also be sought in meetings and consultations with international organisations active in the fields of tsetse and trypanosomosis control, to determine areas of co-operation, avoid duplication and enhance synergy.

Efforts will be made to raise funds for the short-term PATTEC operational plans. Other activities will include: the determination of medium and long term PATTEC activities; launching of public awareness campaigns; undertaking of popularisation and consultation missions; identification and appointment of Patrons; holding of meetings between managers of existing projects and Integration of existing projects in PATTEC.
A group of appropriately qualified experts will meet to determine the criteria for prioritising areas in which to initiate eradication operations. New projects will be prepared by groups of consulting experts, identifying and evaluating the requirements as well as the strategies and procedures for tsetse eradication in selected project areas.

Regional and national co-ordination offices will eventually be set up as required, depending on the number of active projects requiring co-ordination.

Efforts will be made to make use of the Secretary General's office as well as the governments of Member States to raise the necessary financial support for the projects, through continued lobbying and promotion of awareness about the problem of trypanosomiasis and the benefits that will accrue from its total elimination.

5.6. Estimated Budget For The PATTEC Co-ordination Office

- Estimates based on the assumption that the PATTEC Co-ordination Office will initially be established in Addis Ababa at the OAU General Headquarters, rent-free.
- Initial space requirement of 3 offices and a boardroom for meetings, also to serve as a reference section and provide sitting space for short term consultants.
- Items required: 4 PC computers each with printer, facilities for E-mail and Internet connection; telephone with exchange and extensions to 4 locations; photocopier; items of furniture, including lockable cabinets, chairs, tables, shelves; fittings and furnishings; motor vehicles (2); visual aids equipment, including TV, video, projectors (overhead, slide and data); desktop publishing equipment for the production of documents and publicity materials
- Salaries for project staff: Initially the PATTEC Co-ordination Office will hire the following staff:
  - Co-ordinator (Programme Manager)
  - Administrative Assistant (Office management and finances)
  - Information and Data collection, storage and dissemination
  - Driver / Messenger
- Short Term Consultancies and Expert Group Meetings
  - Establishment of criteria for selection of areas for tsetse eradication projects; including the identification of the appropriate areas in which to locate Centres of Excellence to boost the technical and operational capacity of the affected countries in the eradication campaign, e.g. mass-rearing centres, diet preparation centres, testing and analytical centres, etc.
  - Writing of new tsetse eradication projects in identified priority intervention areas and opportunity areas, for example the Ethiopian valley systems, the cotton belt or moist savannah in west Africa or the Lake Victoria basin
  - Establishment of data and information management system at the PATTEC Office
  - Determination of the requirements of the PATTEC initiative
  - Preparation of Public Awareness and promotional materials
  - Harmonisation and integration of on-going and planned projects to support or complement the concepts and strategies of the PATTEC initiative
- Meetings and Consultations
- Secretary General’s consultations with member states, mandated organisations and donors
- Meeting of the managers of on-going and planned projects

- Meetings of line Ministers on PATTEC issues
- Provision for office space rent
- Travel and Missions of officials of OAU and others for PATTEC

- Establishment of monitoring and co-ordination structures and systems for existing eradication projects, including:
  - Activities in the southern and western valleys of Ethiopia (*G. pallidipes* and eventually other tsetse species)
  - The Lambwe Valley tsetse project in Kenya (*G. pallidipes*)
  - Activities in the Kenya / Uganda border zone
  - The Buvuma Islands Project in Uganda (*G. f. fuscipes*)
  - The Mafia Island project in Tanzania (*G. brevipes*)
  - The co-operation between Burkina-Faso and Mali, first focusing on Niger river basin in the Bamako peri-urban area (*G. p. gambiensis*), a model initiative which will eventually be expanded into Burkina Faso and neighbouring countries.

6. CONCLUSIONS

The meeting recognised the enormous constraint imposed by both human and animal trypanosomoses on human livelihoods and agricultural production in sub-Saharan Africa and that these diseases are a root cause of poverty on the sub-continent. Any effort to maintain the status quo of managing and living with an escalating problem should be considered as a move backwards.

There was agreement that this could only be achieved if entire tsetse populations could be progressively eliminated, i.e. by area-wide control. This would and must involve the use of all proven tsetse control techniques but in most (though not all) situations this would ultimately require a *coup de grace* using SIT. The vital and unique role of the IAEA in providing advice on implementing the area-wide concept and technical leadership in the field of tsetse eradication using SIT was recognised and encouraged.

The meeting agreed that sustainable interventions would be dependent upon national prioritisation of tsetse/trypanosomosis eradication as a means of alleviating poverty, and national ownership of all campaigns. To this end, the meeting fully endorsed the OAU Lomé Declaration that tsetse and trypanosomosis should be eradicated from Africa and applauded the formation of Pan African Tsetse and Trypanosomiasis Eradication Campaign (PATTEC) and its proposed plan of action. It recognised that national ownership, commitment to wide-spread implementation independent of aid wherever possible and OAU co-ordination of an eradication campaign based on area-wide control represented an entirely novel approach to this long-standing problem with a realistic probability of sustainable success.

Accepting that many countries would claim priority for PATTEC support, the meeting endorsed the PAAT recommendation that Ethiopia and the West African cotton belt be considered priority areas; together with Botswana which has well advanced plans for a self-
financed tsetse eradication programme using targets, aerial spraying (SAT) and SIT. These areas provide the best option for early PATTEC success.

7. RECOMMENDATIONS

1. Administration

The magnitude of tsetse / trypanosomosis problem in sub-Saharan Africa is of such order that the stepping up of the efforts to contain and eventually eliminate it has become a prerequisite to development over large areas of the sub-continent. The consultative group recognises that national governments have the ultimate responsibility for developing and implementing national plans for poverty alleviation.

Public Awareness. The importance of trypanosomosis and the role of tsetse flies as a root cause of poverty in Africa must be recognised by all levels of society:

- at the diplomatic level by a patron
- through effective, professional publicity campaigns
- by the creation of training opportunities with special attention to career development
- by inclusion in the national curriculum of schools

In order to increase the level of awareness of all stakeholders it will be necessary to build constituencies, empower key stakeholders to play an effective role and mobilise the necessary resources to reach the ultimate goal of eradicating tryps and improving livelihoods, and human and animal health and well-being. This coalition could include governments, international and NGOs, including animal welfare and conservation organisations, the private sector, donors and the civil society. The group recommends that PATTEC seeks to establish alliances and partnerships with these particular groups in conjunction with IAEA, PAAT, FAO, and WHO.

PATTEC Initiative. The meeting unanimously endorsed the PATTEC conceptual framework and the first year plan of action. The group recommends:

a. That the OAU give priority to enlisting African governments into the PATTEC programme.

b. That IAEA continues to support the PATTEC initiative which is committed to area-wide eradication of tsetse and trypanosomosis.

c. That IAEA should, as a matter of urgency, strengthen and enlarge its capacity to implement large-scale SIT intervention against tsetse in areas where the initial tsetse suppression phase is in progress or planned.

Recognising that expanded operations in the field require adequate infrastructure and capability in national staff, in order to collect baseline data, collate information on the impact of the disease, prepare plans for intervention, and design, implement, supervise and evaluate projects and programmes for tsetse and trypanosomosis control and eradication and associated aspects; it is recommended that PATTEC, in collaboration with IAEA and other partners, and with some urgency, undertake a training needs assessment with particular emphasis on issues of sustainability and career development.
2. Funding

Following the commitment of the OAU Heads of State it is envisaged that participating countries will make a clear and unequivocal commitment in terms of cost-sharing for the implementation national programmes under the co-ordination of PATTEC. PATTEC is also expected to stimulate regional agreements between OAU countries in cases of cross-border activities. However, it is clear that African governments alone will be unable to finance all the desired tsetse control and eradication activities. Therefore there will be a clear need for donor commitment at various levels. The ways in which donors may fund the activities can be by bilateral arrangements, project support, or programme support. Therefore mechanisms must be established through which all these approaches can be utilised. It is recommended that the mobilisation effort be strengthened with consideration given to the following:

- Promotion of bilateral agreements in support of tsetse control in specific government-to-government arrangements. This may involve country to country donations and/or loan agreements to sovereign governments. IAEA will agree to advise and use its best influence to promote such agreements between member states.

- Promotion of specific projects to specific donors, NGOs, private foundations. This will involve the preparation of a portfolio of outline projects that can be tailored to individual donor interests.

- Creation of a specific forum for larger donors to provide programme support. Model structures for this are offered by the format of the Onchocerciasis control programme (OCP) in west Africa, the UNDP/World Bank, WHO special Programme (TDR) and others. Under such a structure, PATTEC would be the executive agency backed by a scientific and advisory group (such as PAAT) and a joint co-ordinating board (JCB) comprised of government and donor representatives. It is recommended that IAEA should assist PATTEC in consulting FAO, WHO, IFAD and other international organisation presently involved in large control programmes in order to examine existing models such as OCP and to offer proposals about the precise mechanism for setting up the joint JCB, its mode of operation and initial membership.

3. Research and Operations

a. Operational needs

1. IAEA must prioritize its activities in consultation with PATTEC in relation to SIT programmes to address problems of HAT and AAT, as follows:

- Ongoing operational SIT support to Ethiopia, Botswana and Mali within the PATTEC programme;

- TC assistance to promote upcoming SIT programmes in sites like Lambwe Valley, Buvuma, Mafya Island.

- Planning for future projects in areas agreed through consultations with PATTEC and national governments.

2. High priority to given to the development of large, cheap, fly production facilities in strategic locations in Africa so that SIT becomes just another routine technique in the armory available without the stigma of high cost.
3. It is also recommended that PATTEC:

3.1 establish a set of international criteria for declaring zones tsetse-free

3.2 ensure that projects are compliant with national planning policies, land use and environmental legislation, and international conventions.

3.3 while working under the auspices of the OAU, have the autonomy to follow its own agenda and be accorded diplomatic recognition to facilitate cross border activities for the purpose of efficient project co-ordination and evaluation.

b. Research needs

It is recommended that PATTEC identify key research needs for the implementation of area-wide tsetse control, and submit these requirements to research funding bodies such as DG12 of the EU, Wellcome Trust, and others. It is anticipated that these requirements will include

1. Bait techniques research to be carried out on:

   • target design/colour, odours and appropriate insecticide dosage/formulations for different tsetse species

   • biological agents and chemo-sterilants as alternatives to insecticides

2. SAT research to include:

   • appropriate dosages of insecticide for different species

   • (possibility of using SAT to create barriers in large-scale operations e.g. Sudan/Ethiopia or Zimbabwe/Mozambique border areas.)

3. SIT research to include:

   • population genetic studies to establish isolated sub-populations and national reference collections to be maintained for each area.

   • need for R&D towards efficient sterile male production with special reference to optimising automated fly production, male handling procedures, the alleviation of blood diet constraints, the development of field activities required to accompany local production capability and disease monitoring.
ANNEX A

Summary of Presentations

1. Relevance of Thematic Planning to Normative and other activities of FAO/IAEA by J. D. Dargie, Director Joint IAEA/FAO Division

Normative activities involve the collection, synthesis, analysis and dissemination of information and knowledge. They also serve as a neutral forum for policy and technical dialogue at global and regional levels to prepare, negotiate and conclude cross-border agreements some of which can be legally binding. And they involve the development of norms and standards for establishing and promoting the implementation of priority programmes and addressing critical issues.

IAEA’s normative function focuses on research through its Regular Programme - both in the form of CRPs and through its Laboratory at Seibersdorf. Both of these mechanisms essentially function to develop, validate, harmonise or standardise technology, to strengthen technical and scientific capacities in member countries and ultimately to ensure that the knowledge and technologies which emerge are rigorously assessed before being recommended for wide-scale use and that all information is disseminated electronically or in hard copy to technical and policy-level decision makers so that they themselves can take appropriate action.

FAO has an essentially similar normative role but with its broader mandate, network of offices in the regions and its contacts with the Ministries of Agriculture, it is well placed to provide African and other member countries with the much needed multidisciplinary and inter-sectoral perspectives to development issues, policies and the role of technology.

These normative functions however, cannot stand alone and require operational activities which serve as a tool for implementing, assessing and validating the results in a tangible way. IAEA’s Technical Co-operation incorporates such a strategy through its thematic planning component. Thematic planning is a mechanism that correlates a problem, the best technical solution possible and the stakeholders - it tries to define a strategy of interaction between the three for maximum impact.

Thematic planning has great scope for strengthening and expanding the interplay between normative and operational in the formulation of technical programmes so that they can indeed have an impact in the lives of the beneficiaries or stakeholders.

2. Thematic Planning Concepts by R.F. Kastens

A theme can be defined as a unifying subject or topic of discussion, hence, the term thematic reflects a process that organises a subject for a specific purpose.

In IAEA, thematic planning is a management tool that endeavours to create a link between a subject/topic and the best practices of nuclear science and technology to provide a single sustainable solution. It outlines strategies of how to translate this link into concrete plans - how the existing technological, managerial and operational know-how can best be utilised in an effective and efficient manner to address a problem for maximum impact. Salient questions such as what technological options exist? what is most appropriate? what has been tried
before? how can it apply in this situation? is it the best suited? are all addressed in the planning process. For managers, the process provides a work plan outlining objectives, time frames, roles, responsibilities and the expected outcome.

Thematic planning is important because:

- It seeks to combine several themes into a unified approach for addressing a problem providing for more efficient use of resources
- It identifies the key problem and selects the best solution possible from lessons learnt and best practices.
- It’s a process which generates new knowledge for future programming
- It promotes dialogue ensuring greater commitment and ownership.


The concept of tsetse-free zones builds upon the area-wide Integrated Pest Management (IPM) strategy.

A model developed by E. F. Knipling compares area-wide and non-area-wide IPM interventions: Over five insect generations a non-area-wide IPM intervention with intensive (99% of possible efforts / intensity) but non-uniform treatment (10% of the area is left out) results in 1000 times more pest insects than a less intensive (90% of possible efforts / intensity) but area-wide treatment (100% of the area is uniformly treated). Therefore, an area-wide, uniform IPM treatment of an entire insect pest target population is more effective, even at reduced treatment intensity, than a non-area-wide intervention.

Past efforts to control tsetse and trypanosomosis were largely small-scale programmes limited within national borders, although tsetse habitats frequently extend across borders. Due to different reasons usually only part of the target populations was treated resulting in a non-area-wide intervention effort.

The tsetse fly belt that covers two thirds of Africa does not form a continuous distribution area but rather consists of a patchwork of distinct tsetse populations of different species. Area-wide programmes against tsetse for the creation of tsetse fly free zones need to utilise various intervention techniques in an integrated manner and will be based on two principle strategies:

a. the identification of isolated tsetse populations and their removal one by one;

b. the ‘rolling-up’ approach which strives to start at the edges of the tsetse fly belt and from there continuously expands the fly free area by advancing the intervention front into infested areas.

Particularly the removal of isolated tsetse islands or peninsulas (strategy a) underlines that area-wide tsetse intervention does not necessarily have to be only large scale operations and can be applied together with the affected communities, provided the entire pest population is targeted.

The planning and implementation of programmes that aim at the creation and expansion of tsetse fly free zones must involve partners, who take care of an appropriate and responsible utilisation of available resources.
4. Review of Technologies and Recent Trends by J. Kabayo

The earliest efforts to control tsetse fly and trypanosomosis by colonial powers such as Britain, France, Belgium and Portugal focused mainly on pest control and eradication or treatment of the disease. In the post-independence era there has been a shift from eradication to control, to management of the disease to living with the disease. Some of the more popular strategies in tsetse management include technology transfer, sustainability, community participation, environmental acceptability, integrated pest management and the area-wide approach of the IAEA/FAO joint programme.

Presently, three methods exist for the management of trypanosomosis:

1. Indirect methods: avoidance, wildlife destruction, wildlife fencing, habitat destruction

2. Direct methods against the vector (tsetse flies): chemical control methods using insecticides, growth regulators, chemosterilants, pheromones, attractants, repellents; biological control through viruses, bacteria, fungi, parasitoids; physical methods including trapping devices, chemicals and the sterile insect technique (SIT).

3. Parasite detection and treatment methods include: wet-film microscopy, DG-MHCT / Buffy Coat test; trypanosome Antigen and / or Antibody detection (ELISA); IFAT; CATT; DNA Probe (PCR); trypanocide based treatment and prophylaxis against trypanosomes; Immunology; Genetics; Molecular Biology.

So far, one of the more successful of all these techniques is the Sterile Insect Technique (SIT). SIT involves the sustained aerial release of sterile males reared in special rearing facilities among the indigenous target population. The males are sterilised by radiation at an appropriate stage and results indicate that mating these males with fertile females creates infertility in the female throughout her remaining life cycle. Females usually mate only once.

SIT was successfully applied in 1964 on an island in Lake Kariba in Zimbabwe. Field-collected G. m. morsitans pupae were treated with the chemosterilant, tepa R to produce sterile males that were then released causing a reduction in the tsetse population on the island. Other trials include Mkwaia Ranch, Tanzania in 1971, Burkina Faso in 1976-1984, Nigeria in 1979-1987 and Unguja Island, Zanzibar in 1994-1997 where the last case of trypanosomosis in cattle was detected in 1997. New projects involving this technique are being initiated in Ethiopia (1997), Mali (2001), Uganda (2001), Kenya and Mafia Island in Tanzania.

5. Economics of Tsetse/Trypanosomosis Eradication or Control by L. Budd

Does the size of project areas matter when economics of tsetse control or eradication projects are assessed?

Project size matters in relation to:

- The cost of preventing re-invasion
- Available economics of scale
- Average level of benefits
- Project size and project complexity
Conclusion:
1. It is important that tsetse control projects are of the right size.
2. There is no single right size of any project.

6. Trends in Livestock Investments by Cees de Haan

While trends in the content of livestock development activities in the 1970s was characterised by production and processing of livestock, centralised management, weak linkages with policies and economic growth orientated, the trends of the 1990s are more participatory and decentralised focusing on provision of services such as health, breeding, natural resource management with more emphasis on policy with poverty reduction as the development goal.

There has been declining support in livestock-only investments with a significant drop from 350,000 USD/year in 1974-79 to about 50,000 USD/year in 1999-2000. Similarly investments in livestock components dropped from 1 million USD/year to about 200,000 USD/year for the same period. There has also been a major decline in donor contributions particularly GTZ and DGIS. DFID funding is being channelled to those livestock activities that have scope for creating sustainable livelihoods, French Co-operation is emphasising producer organisations but on the whole the EU is focusing more on regional and mostly animal health related issues.

This decline can be attributed to:

- Structural adjustment and changing structure of the sector forces have shifted to private sector;
- New international investment instruments do not favour livestock keepers, e.g. programme lending (ASIPs, PRECs) is giving priority to social services, urban areas, infrastructure thus marginalizing livestock keepers. Decentralisation (community action plans) have reduced investments in livestock because of its limited absorptive capacity with priority being given instead to social services, infrastructure and irrigated crops;
- Perception of poor performance and unfavourable PR of livestock development investments e.g. negative reporting, livestock related health scares.

International funding of tsetse management would depend on:

- Integration of programmes into national strategies
- Clear, sustainable economic benefits
- Social impact leading to equitable economic growth, poverty reduction
- Environmental impact on bio-diversity, land use and land degradation

7. Tsetse challenge of Human African Trypanosomosis (HAT) by J. Jannin

Although Human African Trypanosomosis (HAT) or sleeping sickness was nearly eradicated in the 1960s, the last two decades have witnessed a resurgence in the disease in nearly all 36 countries where it is endemic with near-epidemic levels in Sudan, Angola and the Federal Republic of Congo. Sleeping sickness infects the victim with a range of symptoms including extreme lassitude which gives the disease its name. Victims left untreated show mental deterioration, seizures, with 100% fatality. With an estimated 350,000-400,000 people infected
and another 3-4 million people under surveillance, the impact of HAT ranks alongside that of AIDS and Malaria.

The major concerns for treatment have been:

- Availability and affordability.
- The drug market has been very unstable with numerous problems of uncertain production, unavailability of stock, halted production and unaffordable prices for most patients.
- Treatments failing and drug resistance?
- There is a growing number of cases which are not responding to registered drugs as well as a high relapse rate.
- Treatment centres do not have adequate capacities.
- In April 1999, the World Health Organisation (WHO) established a Treatment and Drug Resistance Network which within the framework of national programmes, collaborates with NGOs and the private sector in monitoring drug resistance and recommending solutions for the treatment of sleeping sickness through research and surveillance. Its objectives include:
  - Co-ordination network for control to ensure sustainability in field activities
  - Enhance epidemiological surveillance systems
  - Establishment of a drug resistant network
  - Interagency collaboration through PAAT
  - Development of the Information System

The network which consists of the five most adversely affected countries, i.e., Angola, Sudan, Democratic Republic of Congo, Central Africa Republic and Uganda is expected to grow to 17 member countries.

8. Environmental Impacts of Insecticide Technologies by Prof. Ian Grant

One of the most contentious issues associated with the eradication of trypanosomosis is the use of insecticides. The application of formulations of organochlorine insecticides including DDT, γ-BHC and dieldrin as an effective and inexpensive approach to tsetse fly control have since the 1950s supplanted the extermination and destruction of bush approaches. Two common techniques of using insecticide are the residual and non-residual techniques.

Residual Insecticide Technique

Indiscriminate ground spraying

Compounds are applied at dosages that ensure the longevity of toxic action and cost-effective control. Indiscriminate residual spraying, i.e., meaning all vegetation with highly persistent OCs is practised widely in East and Southern Africa. The side effects on wildlife is high mortality amongst reptiles, small mammals, fish, birds and insects.
Discriminative ground spraying

The targets of this technique are the known tsetse fly resting sites but there are often major logistic problems particularly over large areas and in remote or isolated areas. The impact on wildlife is considered less severe.

**Non-residual Techniques**

Aerial spraying

The severe side effects on non-target fauna associated with air and ground spraying of residual doses were alleviated with the introduction of sequential aerial spraying (SAT), which replaced the highly persistent OCs with the less-persistent endosulfan. SAT is the repeated application of non-residual, low-dosage insecticide aerosols to tsetse populations usually from low-flying, fixed-wing aircraft. The most severe side-effects have been temporary depression of some insect populations and fish mortality in shallow fresh water.

Targets and Traps

Mono- and bi-conical, the most common traps, create a visual stimulus to which tsetse respond by flying into them. Their efficiency has been improved by the addition of strips of insecticide treated material or chemical attractants dramatically reducing the tsetse population at low cost and without unwanted side-effects. However, there is a need to determine the impact of targets and traps on tabanid populations and the consequences of declines in pollination of plant species associated with their mortality.

Dips and ‘Pour-Ons’

The introduction of pyrethrroids, insecticides of low mammalian toxicity but with acaricidal properties has enabled the protection of cattle against fleas, ticks and other biting flies. Possible side-effects include threats to water supplies as well as mortality among dung beetles which play a critical role in burying dung that maintains soil structure, water holding capacity and fertility in semi-arid areas.

9. **Use of the Sequential Aerosol Technique (Aerial Spraying) in Integrated Area-Wide Tsetse Intervention Campaigns by R. Allsopp**

SAT applies a sequence of non-residual, low-dosage insecticide aerosols to tsetse populations, usually from low-lying, fixed-wing aircraft. Each application kills all adult tsetse in the target area and they are repeated at intervals timed to kill all emerging juveniles before they can mate and deposit new larvae. Formations of 2 to 4 aircraft can operate together, treating up to 10,000km2 per cycle for 5 cycles. New developments in navigation avionics (differential GPS) keeps the aircraft accurately on course for up to 100km, then facilitates a return on a parallel, reciprocal heading offset by only 250m.

SAT is not labour intensive - it is a mechanised technique which requires a few well qualified and highly motivated personnel. It treats large areas rapidly and is therefore well suited to epidemic situations or where urgent resettlement follows civil unrest etc. It is also suitable in areas where access is difficult (the Okavango Swamps), dangerous (mined areas e.g. Angola or Mozambique) or undesirable (wildlife habitat where access roads can be used by poachers). It
does not disturb the natural habitat or require the creation of road networks, nor does it leave control materials as ‘litter’ in wilderness areas - which can occur with targets. The insecticide remains in the terrestrial environment for a few hours at most and a few days in water. Years of monitoring has shown that SAT has no long term irreversible effects on non-target species.

SAT cannot be used with confidence to eradicate tsetse from very mountainous terrain and because it is a non-residual technique, an area can be immediately re-invaded unless applied to discrete populations or used in conjunction with barriers. It does, however, have a proven record and as long as tsetse control continues to rely upon insecticides - as it will for the foreseeable future - SAT is a delivery method which has a unique capability for rapid and large scale population suppression. In these respects it is particularly well suited as a complement to SIT.

10. Use of Bait Techniques (Traps and Targets) in Community-Based and Large Scale Intervention Programmes by F. Olooo

Past experience has shown that communities can be effective in the suppression of tsetse fly population within a limited environment. One technique which involves the use of traps and insecticide impregnated targets, with or without odour attractants has been particularly effective in suppressing tsetse target populations such as in Vavoua (Cote d’Ivoire), Busoga (Uganda) and Nguruman (Kenya). The average elimination rate was estimated at over 90% in all cases for periods up to 10 months.

Lessons Learnt for Community Participation

- The first step in community involvement should be on awareness creation campaigns so that all stakeholders become familiar with the issues, significance and relevancy, nature and scope of activities and the expected outcome. This could include the use of posters, community meetings and participatory planning workshops.
- To the extent possible, multidisciplinary training teams should be used particularly in emphasising the linkages between tsetse fly and socio-economic development.
- Community ownership should be emphasised. Coupled with training, ownership can be a very effective tool in ensuring commitment and continuity of the activity.

Constraints to Community Participation

- Difficulties in enrolling community support to maintain common barriers. More interest is given to maintaining the immediate environs than creating a common public barrier zone.
- People with few or without cattle and those not earning a direct livelihood from animal farming may not be conscientious in maintaining traps/targets.
- Benefits accruing to ‘free riders’ may discourage others.
- Communities may be too poor to afford targets/traps.
- Sustainability particularly if results are slow or in the event of recurrences.
- Theft of targets and traps.
- The constant need for sustained supervision and management to ensure that community efforts are kept abreast with technological developments particularly in the use of insecticides and possible side-effects.
Recommendations

- Communities should be encouraged to take the lead in tsetse control.
- For larger scale operations, inter-community technical teams should be formed.
- Most rural people lack resources and the local poverty level should be taken into account in the design of programmes.
- Baited insecticide impregnated traps and targets need to be improved for some tsetse species.
- Capacity of traps and targets may be improved by additional use of IGRs and other chemosterilants.

11. Trypanotolerance, vaccine development and other integrated intervention tools by J. McDermott

Current and Future Trypanosomosis Control Options

Current strategies for combating trypanosomosis are aimed at vector control or avoidance such as traps, insecticide-treated targets (attractants), insecticide-treated animals, area spraying and SIT. Other programmes use chemotherapy, i.e. the use of trypanocidal drugs for curative or as prophylactics, whilst others emphasize the selective breeding of trypanotolerant cattle. Furthermore, there is on-going research to develop a vaccine either against the disease or the parasite - trypanosomes.

Chemotherapy, trypanotolerance and vaccines

Trypanocidal drugs are made up of salts of 3 chemical compounds, namely, homidium, isometamidium and diminazene. It is unlikely that there will be any further development of new compounds as studies in Ethiopia, Uganda, Burkina Faso, Zambia and Kenya indicate trypanocide resistance.

Trypanotolerant breeds of livestock are being widely used in Africa using the following two techniques - one is the development of tools for selective breeding of trypanotolerant cattle to enhance the economically important traits of livestock and secondly using biotechnology, identify markers for selection and genes controlling trypanotolerance and other key disease tolerance/resistance traits.

There is ongoing research to develop two vaccines - an anti-disease vaccine which mimics trypanotolerance that is currently being tried on cattle while another vaccine which targets ‘surface’ protein (VSGs and flagellar pockets) is being tried on mice.

Integrated control of tsetse advocates the use of a combination of the above methods for example:

- Private farmer: trypanotolerant cattle, chemotherapy and pour-ons
- Public community: traps/targets, extension education and community health programmes
- Public Area: large scale tsetse control methods, SIT and other eradication techniques
Central to the selection of the techniques are the issues of economic impact (who pays, who benefits) and whether they are ecological sustainable.

12. Best Practices in Large Scale Interventions by M. Jeggo

(This presentation did not focus on the tsetse fly problem but instead sought to highlight some salient points in a similar programme - the Global Rinderpest Eradication Programme and PARC - which could be relevant to the tsetse fly eradication efforts.)

Background

The Pan African Rinderpest Campaign (PARC) which was launched in 1986 in Addis Ababa, Ethiopia had the two major objectives of eradicating Rinderpest from the African continent and improving animal health services. PARC was later replaced by the Pan African Programme for the Control of Epizootics (PACE) whose aim is the surveillance of epizootic diseases in Africa to accurately determine their prevalence and impact on livestock production. This programme is supported by FAO’s Global Rinderpest Eradication Programme (GREP) links rinderpest campaigns in Africa and Asia and collaborates with national, regional and other international organisations to provide a forum for co-ordinating activities and technical support.

Rinderpest has been apparently eradicated in many African countries, and these are progressively entering the OIE Pathway to certified freedom from disease and from infection. Cases of infection have been reported in Sudan and the Somali. PARC’s positive results offer a firm basis from which to finally eradicate rinderpest from Africa and to control other major epizootic diseases of livestock.

Relevant lessons for the SIT Tsetse Fly Eradication Programme

1. Technical

The programme should be technical feasible drawing on existing plausible and proven technology rather than requiring new innovations or research.

Success is greater if efforts are aimed at addressing one causative organism, using a single vaccine and seeking lifelong immunity.

A single approach that outlines a common purpose should be used in all countries - an internationally developed and agreed upon plan.

Issues related to the ecosystem should be considered.

2. Political

Need for total commitment from the OAU, member governments and other key stakeholders such as UN agencies, World Bank and donor governments. As much as possible, the agenda should be linked to other regional issues such as structural adjustment programmes, privatisation rather than addressed in isolation.

Need for continuous focus on technical rather than political/administrative/economic issues.

3. Financial
As many sources of funding as possible should be identified to avoid a resource crunch as in the case of PARC where actual cost exceeded the estimated cost by 800 million Ekes.

Funding should be channelled through one regional institution with technical expertise rather than political interest. Funding should also be linked to national projects with adequate resources.

Time is an important element to avoid donor fatigue

Critical to the success of any programme are four F’s - focused, feasible, financiable, and foremost (is it a priority issue).

13. Tsetse/Trypanosomosis Control Programme in Botswana by T.K. Phillemon-Motsu

Background

During the last 8 years, the tsetse infested areas in Botswana have increased from 5,000 to 12,000 km² and more than 300 cattle died in the first outbreak in more than 10 years.

Subsequently, the Government approved and adopted a 3-phased tsetse and trypanosomosis control strategy:

Phase 1: Chemoprophylaxis

To prevent further cattle deaths samorin (free of charge) is being administered and will be repeated every four months until the situation is stable.

Phase 2: Tsetse Suppression

To suppress the tsetse population by aerial spraying for 2-3 years from June 2001 throughout the Okavango Belt. Odour baits will also be used.

Four aircraft will fly 3 sorties per night for about 8 nights per cycle with intervals of 10-20 days depending on prevailing temperatures (why?). Deltamethrin supplied as a 0.35% ultra-low-volume formulation will be applied in swathes of 270m over five cycles at a dosage rate of 0.26g/ha. Three monitoring teams will be set up - an eco-technical team to ensure compliance with operational procedures to minimise contamination; an environmental monitoring team to study key indicator species to assess the non-target effects and to detect any inadvertent overdosing; and entomologists to assess the results of the spraying by ovarian dissection to determine whether they are old survivors or newly emerged flies.

Phase 3: Eradication

Using the Sterile Insect Technique (SIT) as the final phase of the eradication campaign.

Collaboration with IAEA

- Samples of wild pupae are sent regularly to Seibersdorf since 1998 with the result that a small G. m. centralis colony has been established.
- There is a need to establish a small field insectary in Maun, Botswana in order to increase pupae production and initiate tsetse mass rearing.
A field cage mating competitiveness studies of the two G.m.c. strains from Botswana and Tanzania need to be conducted soon.

14. Tsetse/Trypanosomosis Control Programme in Ethiopia by A. Mebrate

The two previous efforts of treatment with drugs and use of insecticide impregnated traps and targets covering small fragmented areas focused on recommended technology rather than local capacity-building and lacked government commitment with the result that the problem was only alleviated rather than a permanent impact. In the meantime, the tsetse fly continued to multiply to near epidemic levels, with species developing drug resistance and increasing their habitat into higher altitudes.

In 1997/98 the Southern Rift Valley of Ethiopia Tsetse Eradication Project was started in an area which although isolated, has great agricultural potential. A small field insectary was established in Arba Minch near Addis Ababa from which tsetse pupae were sent to the Agency’s laboratories in Seibersdorf for colony establishment. Kaliti was identified as the site for the main insectary and a warehouse renovated as a temporary insectary to initiate tsetse mass-rearing. In 1999 and 2000, the collection of entomological and veterinary data in the target area was completed and suppression of the tsetse population by use of insecticide impregnated traps and targets initiated. Several fellows were trained in various aspects related to the implementation of this project.

The project has a four-pronged strategy involving:

- an initial area-wide eradication approach;
- a phased activity approach where the project area is divided into blocks where natural and artificial barriers are used to prevent re-infestation;
- conditional and dynamic programming approach. The results of operational research and assessment of the results of preceding activities determines the implementation of follow-up activities;
- an integrated and participatory approach which entails collaboration between government, NGOs and local communities in decision-making, planning and implementation and application of appropriate conventional technologies.

Major activities include the application of SIT and capacity-building, i.e., manpower training for short-term and long-term capabilities.

15. Pan African Tsetse and Trypanosomosis Eradication Campaign (PATTEC) Plan of Action by S. Haile Mariam

The escalating incidences of trypanosomosis highlights problems of unsustainability of past approaches to control the disease, and accentuate the significance of the disease in Africa’s desperate struggle against hunger, poverty and disease, creating the urgent need to devise effective methods of coping with the disease.

The Pan African Tsetse and Trypanosomosis Eradication Campaign (PATTEC) is a programme initiated by African countries with the intention of eliminating tsetse and trypanosomosis from the continent within the shortest time possible. PATTEC demonstrates in a very clear manner African ownership and responsibility for the elimination of an African
problem and will serve as a mechanism for all stakeholders to work in a concerted effort with the governments to develop a single strategy.

The programme comprises an international campaign to institute a process of phased, systematic and sustained action through the introduction and support of proven and new techniques and technologies such as SIT for a more efficient and effective campaign that is both environmentally appropriate and sustainable.

PATTEC will start with ongoing and planned projects and initiate new projects in other priority areas that may be selected, one at a time using the rolling approach strategy. Selection criteria include the diversity of tsetse species, the degree of isolation of the tsetse population, the ease of eradication of the species and the socio-economic importance of the area being considered i.e. land use pressure. Efforts of any two or more member countries that have contiguous infested areas will be conducted jointly. PATTEC will endeavour to ensure that all major disparities in operational capacities between the countries involved are addressed and that the necessary tsetse and trypanosomosis policies are formulated and harmonised.

Efforts will be made to identify, integrate and harmonise existing or planned tsetse and trypanosomosis programmes as well as related rural development schemes including the promotion of agricultural development in suitable areas, the linking of ongoing and planned projects with the PATTEC, the detection and treatment of sleeping sickness and nagana and the provision of support for the development and application of appropriate conventional and new technologies for fly population control and barriers establishment.

Key actors will include:

- National government whose role will be to initiate, formulate and approve new projects. They will also make human, financial and material resource contributions to projects.
- Local communities who will be trained and encouraged to provide material, moral or any other support.
- Donor community to provide funding mainly through bilateral agreements.
- International organisations (FAO, IAEA, WHO) who will provide technical support.
- Private sector.

16. IAEA-OAU Co-operation by J. Kabayo

The Organisation of Africa Unity (OAU) and the International Atomic Energy Agency (IAEA) co-operation will be channelled mainly through support to the Pan Africa Tsetse and Trypanosomosis (PATTEC). The PATTEC initiative which is organised as a special independent programme under the Secretary General will be set up within the Inter-African Bureau for Animal Resources (OAU/IBAR).

As a key player in the campaign on the eradication of the tsetse fly, the IAEA brings with it technical expertise both from a normative and operational perspective. More specifically, IAEA will provide the following support to PATTEC:

- to support the establishment of the PATTEC office;
• integrate existing and planned IAEA projects into the PATTEC framework; particular emphasis should be on the use and establishment of mass rearing facilities;
• provide technical backstopping for projects using the SIT;
• provide technology transfer and training in the SIT
• provide support for research into operational problems relating to the application of SIT in field situations;
• continue support for the preliminary overview of the economics of hypothetical/model projects in West and East Africa;
• in close collaboration with the national governments and other partners, including the private sector, support PATTEC to assume a leading role of developing specific plans for area-wide tsetse eradication, starting with areas as specified.

Also of great importance in the OAU-IAEA collaboration is the role that the Agency can play in strengthening alliances already established with OAU/PATTEC, WHO, FAO, other UN organisations, CGIAR research organisations, ISCTRC and OIE. IAEA will also endeavour to pro-actively widen the moral and financial support base for the PATTEC activities with the international lending institutions, NGOs and governmental and independent donor organisations.

17. The SIT Forum by A. Mebrate

The Pan African Forum for the Development and Application of the Sterile Insect Technique (SIT Forum) was established by the OAU in 2000 to facilitate the sharing and exchange of information, experiences and technical know-how in the development and implementation of the SIT in member states.

Its main functions are:
• Mobilisation of African states
• Organisation of relevant field programmes
• Design an operational framework for tsetse eradication
• Review reports and advise the PATTEC Office on any technical issues.
• Establish and make available databases on the development and application of SIT
• Mobilisation of material, financial and human resources required for a tsetse SIT

The SIT Forum will endeavour to build and sustain partnerships with international organisations and donors to implement its agenda. In this regard, the IAEA is seen as one of the principal partners in view of the unique role the Agency can play in terms of SIT technology transfer. Other key partners are FAO, WHO, ISCTRC and PAAT.
ANNEX B

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<th>Room No.:</th>
<th>Extension</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mr. Qian Jihui</td>
<td>B1136</td>
<td>22300</td>
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<tr>
<td>Mr. W. Burkart</td>
<td>A2382</td>
<td>21600</td>
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<tr>
<td>Mr. J.D. Dargie</td>
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<td>Mr. A. Shihab-Eldin</td>
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<td>21628</td>
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<td>Mr. U. Feldmann</td>
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<td>Mr. M. Jeggo</td>
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<td>Mr. A. Robinson</td>
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<td>B0979</td>
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<td>Mr. T. Tissue</td>
<td>B0980</td>
<td>26042</td>
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<tr>
<td>Mr. P. Fouchard</td>
<td>B0981</td>
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# ANNEX C

Agenda of the Meeting

**Monday, 29 January**

<table>
<thead>
<tr>
<th>Time</th>
<th>Session I</th>
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<tbody>
<tr>
<td>09:00 - 09:50</td>
<td>Introductory remarks</td>
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<tr>
<td></td>
<td>Relevance of Thematic Planning for normative and other activities of FAO/IAEA</td>
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<td>Thematic Planning concepts</td>
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<td></td>
<td>J. Qian - DDG-TC</td>
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<td>W. Burkard - DDG-NA</td>
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<td>J.D. Dargie</td>
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<td>R.F. Kastens</td>
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<tr>
<td>09:50 - 10:10</td>
<td>IAEA – area-wide concept and SIT</td>
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<td>10:10 - 10:30</td>
<td>Concepts of tsetse-free zones</td>
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<td>10:30 - 10:40</td>
<td>Review of technologies and recent developments</td>
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<td>10:40 - 10:50</td>
<td>Coffee/tea break</td>
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<td>Designation of Chairman and Rapporteur</td>
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<td>U. Feldmann</td>
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<td>J. Kabayo</td>
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<td>L. Budd</td>
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<td>C. de Haan</td>
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<td>J. Slingenberg</td>
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<tr>
<td>10:50 - 11:15</td>
<td>Economics of tsetse control/eradication</td>
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<td>11:15 - 11:40</td>
<td>Economics of tsetse/trypansomosis eradication/contol</td>
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<td>11:40 - 12:05</td>
<td>Investment trends in livestock</td>
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<td>Priority areas for tsetse/trypansomosis intervention</td>
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<td>J. Jannin</td>
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<td>J. Grant</td>
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<td>12:05 - 12:30</td>
<td>Human dimension</td>
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<td>12:30 - 14:00</td>
<td>Tsetse challenge and Human African Trypanosomosis (HAT)</td>
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<td>Lunch break</td>
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<td>14:00 - 14:25</td>
<td>Environment</td>
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<td>Environmental effects of tsetse intervention (all tools)</td>
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<td>I. Grant</td>
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<td>14:25 - 14:50</td>
<td>Complementary intervention tools</td>
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<td>14:50 - 15:15</td>
<td>Use of the Sequential Aerosol Technique in integrated area-wide tsetse intervention campaigns</td>
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<td>15:15 - 15:45</td>
<td>Use of traps and targets in community-based and large scale intervention programmes</td>
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<td>15:45 - 16:10</td>
<td>Coffee/tea break</td>
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<td>Trypanotolerance, vaccine development, and other integrated intervention tools</td>
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<td>J. McDermott</td>
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<td>16:10 - 16:30</td>
<td>Experience and developments</td>
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<td>16:30 - 16:45</td>
<td>Principles of preparing for and implementing area-wide programmes</td>
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<td>16:45 - 17:00</td>
<td>Best practices in large scale interventions</td>
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<td>17:00 - 17:15</td>
<td>Trypanosomosis programme in Botswana</td>
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<td>Trypanosomosis programme in Ethiopia</td>
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<td>Housekeeping</td>
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<td>C. Schofield</td>
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<td>T.K Philemon- Motsu</td>
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<td>A. Mebrate</td>
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Tuesday, 30 January

08:15 – 09:00  Meeting with leaders of discussion groups
09:00 - 09:20  Summary of key points from Monday  Chairman

Session VII  New African Initiatives
09:20 - 09:40  Plan of action - OAU/IBAR strategy/PATEC  S. Haile-Mariam
09:40 - 10:00  IAEA/OAU co-operation  J. Kabayo
10:00 - 10:15  SIT Forum  A. Mebrate
10:15 - 10:30  Coffee/tea break

Session VIII  Discussions
10:30 - 12:00  Technical opportunities and constraints  A. Robinson
12:00 - 14:00  Lunch break
14:00 - 15:30  Training and institutional requirements  P. Holmes
15:30 - 15:45  Coffee/tea break
15:45 - 17:15  Implementation strategies  C. Schofield
17:15 – 18:00  Summary of discussions  Chairman
19:00  Social Event

Wednesday, 31 January

Session IX  Preparation of Report
9:00 - 10:30  Discussion on consensus issues and draft recommendations
10:30 - 10:45  Coffee/tea break
10:45 - 11:00  Designation of Drafting Groups
11:00 - 13:00  Work in Drafting Groups
13:00 - 14:00  Lunch break
14:00 - 17:00  Work in Drafting Groups
17:30  Meeting of the Drafting Groups

Thursday, 1 February

Morning  Drafting Groups Contd.
11:00  Submission of Drafting Group Outputs to Rapporteur for Collation of 1st draft
13:00 - 14:00  Lunch break
14:00 - 16:30  Review and agreement on first draft  Rapporteur
16:30 - 16:45  Chairman's Report
16:45 - 17:30  Closing of meeting  DDG-NA/TC

Friday 2 February

09:00  Follow up discussions with programming staff TCPA/NA
12:00  Draft report available (A2216)
14:00  Visit to Seibersdorf Laboratories (optional)
ANNEX D

Meeting Prospectus and Background Note

IAEA Thematic Planning: the role of the Sterile Insect Technique (SIT) for area-wide control/eradication campaigns against the African Tsetse Fly. 13-17 November 2000. IAEA Headquarters, Vienna Austria

Thematic Planning is a prescriptive planning tool for IAEA technical cooperation (TC) activities. The process seeks to elaborate the relative effectiveness and efficiency of a technique/technology based upon successful TC projects that have demonstrated a significant contribution to national socio-economic development, or where solid evidence exists to predict such a contribution. The process results in a Thematic Plan that complements Country Programme Frameworks² (CPF) by providing a problem based analysis for a technology package that helps to ensure the relevance, sustainability and impact of technical cooperation between member states and IAEA. The strategic value of a Thematic Plan is in prioritizing and providing guidance for TC technical applications based upon the IAEA’s best experience and practices, a clear understanding of the roles and interests of the major stakeholders and opportunities to form new partnerships

Trypanosomosis - a root cause of poverty

The Tsetse Fly is the vector for trypanosomes, a parasitic condition that prohibits livestock production in one-half of Africa, and therefore bars draft power for improved tilling and transition from subsistence agriculture to surpluses.

The presence of tsetse excludes livestock from large areas of considerable agricultural potential. In addition, over 55 million rural people are at risk of human trypanosomosis (sleeping sickness).

- Tsetse flies infest 36 countries and covers an area of 9-10 million km² in Africa
- Over 90% of cattle in sub-Saharan Africa is kept at the periphery of tsetse infested areas
- Direct losses in meat production and milk yield plus the costs of control programmes are estimated at US $0.6-1.2 billion per year (FAO)
- Close to 50 million cattle and tens of millions of small ruminants are at risk from trypanosomosis
- Estimated number of infected persons is over 300,000 (WHO)

Despite a long history of diverse efforts on tsetse / trypanosomosis research and intervention, there is still no appropriate and proven strategy accepted to deal with this problem with sustainable results. Even worse: global climatic changes are favouring an expansion of tsetse into previously uninfested areas. There are severe outbreaks of human sleeping sickness, particularly in areas under civil disturbances. Community-reliant tsetse/trypanosomosis

² The CPF is a diagnostic planning tool that provides a concise, demand-based frame of reference for technical cooperation with member states in the medium term (4-6 years). It utilizes the outcomes of Thematic Planning as a basis for pre project planning and formulation. Strategic value results from common commitment to improving the quality and effectiveness of technical co-operation between member states and IAEA.
management activities that aim at introducing control measures for use by the beneficiaries face serious sustainability problems. In order to feed the growing human population, it will either be necessary to continue expanding low-productive livestock / farming systems into current wildlife areas or to introduce intensified systems in existing agricultural areas and thus protect wildlife areas. The latter involves improved cattle breeds and requires tsetse eradication on an area-wide basis.

The area-wide concept, a holistic approach to insect pest population management that integrates various environmentally acceptable intervention methods, provides an alternative for resolving the livestock barrier of trypanosomosis in an efficient and sustainable manner. Current intervention methods are:

- parasite control through:
  - use of trypanocidal drugs; and
  - in some cases promotion of trypanotolerant livestock;

- vector control or eradication through:
  - traps and insecticide-treated targets, in some cases baited with attractant odours;
  - insecticide-treated animals; and

- the sterile insect technique (SIT).

The establishment of tsetse-free zones can make a significant contribution to improve agricultural development in Africa and support the international agenda on Food Security. The IAEA intends to prepare a Thematic Plan on poverty alleviation in Africa. The objective of the plan will be to establish tsetse-free zones using the sterile insect technique in a co-ordinated campaign to increase agricultural production and livestock development in targeted African Nations. The strategy focuses mainly on four areas for tsetse / trypanosomosis management: a) the Southern Ethiopia valley systems, b) the Lake Victoria basin, c) the Okavango delta, and d) the cotton belt in West Africa. In collaboration with Member States and other partners, IAEA is prepared to commit resources for the development and implementation of a medium-term programme (10 to 15 years).

Constraints and opportunities

Adequate rearing facilities for economical, large-scale sterile insect release in control/eradication programmes are a major limiting factor. Therefore, the establishment of sub-regional mass-rearing facilities could become a high priority. One objective therefore is to ascertain the feasibility of a commercial facility (ies) within the region for the mass rearing, sterilization, handling and shipping of insects for SIT programmes. Technically, a mass-rearing facility can be established in any country. Economically, it could be an attractive investment opportunity if the market for sterile flies were assured. The host municipality would benefit from additional employment and national treasuries throughout the region would gain hard currency balances from not importing insecticides.

Since cost effectiveness is often the deciding factor in determining the viability of SIT programmes and its acceptance by the international community, economic feasibility studies should remain one of
the main objectives of the IAEA programme. Consequently research to improve the mass rearing process (automation, blood supply etc.) will continue to be important.

The IAEA is a technical organization and has not always taken full advantage of partnerships, particularly with agri-business and other private sector interests, in promoting the value of SIT for tsetse control/eradication. IAEA can serve as a catalyst for economic growth by placing greater emphasis on industrialization of SIT production wherever feasible. Tremendous opportunities exist for commercialization of sterile insect production, as well as cottage industries and jobs to support both production, packaging, transportation and release of sterile insects.

Tsetse flies impose a fundamental ecological barrier for developing countries seeking to improve the quality of agricultural production. SIT is a potential breakthrough technology for eliminating a root cause for constraints to agricultural development, and therefore fostering economic growth and prosperity for both small and large holders. However, IAEA possesses limited human and financial resources and faces competing demands for pest control using SIT. When is SIT the most effective solution for tsetse control/eradication? Which member states are prepared to formulate programmes and mobilize resources for area wide efforts? What are the conditions necessary for successful campaigns. What implementation strategies are the most efficient and effective? Where are the opportunities for private sector investment and commercialization? Who in the international community is prepared to provide leadership? The answers to these and other questions will provide clear guidance, realistic criteria and a logical framework for future technical cooperation with member states engaged or wishing to engage in tsetse fly eradication/control activities using SIT. Member States will directly benefit from the forthcoming Thematic Plan for Tsetse eradication/control campaigns and the role of SIT through better programme development and management strategies for partnerships with potential investors/contributors.

The desired outcomes of this thematic planning meeting will be:

- Validation of programme priorities, including R&D.
- Greater understanding of roles and responsibilities of different partners.
- Increased knowledge about member states pursuing or planning agricultural export promotion programmes.
- Identification of future plans and objectives where opportunities exist for collaboration and partnership
- Assessments of country conditions for CPF discussions.
- Agreement on follow-up tasks including: data collection, country assessments, feasibility activities, cost-benefit studies.
- Targets and objectives for outreach and public information activities
- Mechanisms for future coordination.
ANNEX E

PATTEC Plan of Action (draft)
Pan African Tsetse and Trypanosomosis Eradication Campaign (PATTEC)

Enhancing Africa’s Health and Prosperity

OAU

A Continental Plan of Action for the Eradication of Tsetse and Trypanosomosis
The OAU Pathway for the PATTEC initiative

Prepared by A Task Force of African Experts Appointed by the Secretary General of the OAU
KCCT, Mbagathi Conference Centre
Nairobi, Kenya
December 7th – 16th 2000
# CONTENTS

Introductory Note .................................................................................................................. 3

1. Background and Rationale .................................................................................................. 5
   1.1. The Tsetse and Trypanosomosis Challenge .......................................................... 5
   1.2. Past Attempts to Control Trypanosomosis ........................................................... 6
   1.3. The Area-wide Approach ..................................................................................... 7
   1.4. The Birth of PATTEC .......................................................................................... 8
   1.5. Decisions made by the African Heads of State and Government in the thirty-sixth
       Ordinary Session of the OAU Summit, 10-12 July 2000, Lome, Togo on the
       Proposal for the Eradication of Tsetse Flies from the African Continent ............ 9
   1.6. The Benefits of Tsetse Eradication ....................................................................... 9

2. Pan African Tsetse and Trypanosomosis Eradication Campaign (PATTEC) .................. 10
   2.1. The Vision ........................................................................................................... 10
   2.2. The Mission of the PATTEC Initiative ................................................................ 10
   2.3. The Mandate of the PATTEC Coordination Office ........................................... 10
   2.4. The Concept of PATTEC ................................................................................... 10

3. Overall Strategies and Approaches ............................................................................... 10
   3.1. Phased, Area-wide and Sustained Approach ....................................................... 10
   3.2. Joint, Concurrent and Coordinated Action .......................................................... 12
   3.3. Result Oriented and Dynamic Programming Effort ............................................. 12
   3.4. Monitoring and Evaluation of Projects ................................................................ 12
   3.5. Integration of Appropriate Technologies and Approaches .................................. 13
   3.6. Scientific and Environmentally Friendly Approach ............................................ 13
   3.7. Participatory Approaches .................................................................................... 13
      3.7.1. National Governments ................................................................................ 14
      3.7.2. Communities ............................................................................................... 14
      3.7.3. Donors ......................................................................................................... 14
      3.7.4. International Organisations ......................................................................... 14
      3.7.5. Other Stakeholders (NGOs, Farmers’ Associations, etc.) ......................... 15
      3.7.6. Private Sector Involvement ........................................................................ 15
      3.7.7. Human Resource Development and Management ..................................... 15
      3.7.8. Public Relations .......................................................................................... 15
      3.7.9. Information Management ............................................................................ 15

4. Operational Framework .................................................................................................... 15
   4.1. Organisation and Structure .................................................................................. 15
      4.1.1. The African Heads of State and Government .............................................. 15
      4.1.2. The Secretary General of the OAU ............................................................. 16
      4.1.3. Patrons and the Policy and Mobilisation Committee .................................. 16
      4.1.4. The Tsetse and Trypanosomosis Eradication Campaign ............................ 16
      4.1.5. Regional and National Coordination Offices ............................................. 16
      4.1.6. Technical Advisory Forum ........................................................................ 16
   4.2. PATTEC Roles ..................................................................................................... 16
      4.2.1. Identification of Target Areas ...................................................................... 16
      4.2.2. Prioritisation of Areas ............................................................................... 17
      4.2.3. Project Categorisation for Selection ......................................................... 17
      4.2.4. Project Initiation ....................................................................................... 17
      4.2.5. Project Support .......................................................................................... 17
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.2.6. Harmonisation of Different Programmes</td>
<td>17</td>
</tr>
<tr>
<td>4.2.7. Project Implementation</td>
<td>17</td>
</tr>
<tr>
<td>4.2.8. Project Appraisal: Monitoring and Evaluation</td>
<td>17</td>
</tr>
<tr>
<td>4.3. Proposed PATTEC Organisational Chart</td>
<td>18</td>
</tr>
<tr>
<td>4.4. Operational Plans</td>
<td>18</td>
</tr>
<tr>
<td>4.5. The First Year of the PATTEC Initiative (2001)</td>
<td>20</td>
</tr>
<tr>
<td>4.7. Estimated Budget for the PATTEC Co-ordination Office</td>
<td>22</td>
</tr>
<tr>
<td>4.8. Budget Estimate for PATTEC Activities during 2001</td>
<td>23</td>
</tr>
</tbody>
</table>
INTRODUCTORY NOTE

Tsetse fly infestation is one of the most important constraints to rural development in sub-Saharan Africa. By transmitting animal trypanosomosis, tsetse drastically reduces the numbers of livestock available. At the same time, trypanosomosis kills animals used for draught power, thus reducing the capacity of farmers to open up and work the land. Tsetse transmitted sleeping sickness, affects a considerable number of people in Africa with the effect of reducing labour availability as well as increasing the cost of health services. A lot of effort has been expended in initiatives aimed at controlling tsetse over the last one hundred years. There has, however, been limited impact in the reduction of the problem. Some of the areas where tsetse had become considerably reduced have become re-infested over time. As a result, gains made are often lost sooner or later.

African Heads of State and Government, having been under pressure from their communities to do something about tsetse, and realizing that piecemeal solutions would not work, came to the conclusion that the tsetse problem had to be tackled on a continent-wide basis. The OAU Summit held in Lomé, Togo, in July 2000, charged the Secretary General of OAU with the task of initiating a campaign to eradicate this menace from the continent of Africa. The Secretary General, in turn, commissioned a Task Force, comprising experts from 22 African countries to formulate comprehensive strategies and a Plan of Action for the implementation of the Decision by the Heads of State and Government.

The Task Force was facilitated through the OAU/IBAR and held its planning workshop in Nairobi, Kenya, from the 11th – 15th December 2000. The primary objective of the workshop was to gauge the size of the tsetse and trypanosomosis problem, devise mechanisms for addressing it, and develop plans for the elimination of the problem.

The workshop was moderated by an external consultant and was designed and run in a participatory manner. In preparation for the main workshop, a small sub-group of the Task Force met for two days, prior to the meeting of the Task Force, to develop the agenda, outline key issues, develop methods of work and prepare guidelines for the deliberations.

During the workshop, the participants sought to answer certain fundamental questions, among which were the following:

- Is the eradication of tsetse technically feasible and economically justifiable?
- What are the required inputs and expected outcomes or consequences of tsetse eradication?
- What strategies and approaches need to be adopted, what methods should be employed and how should the tsetse eradication campaign be organised for effective execution?
The workshop concluded that tsetse can and must be eradicated. The members of the Task Force discussed the issues before them extensively and developed a common ground on which their recommendations on the strategies and Plan of Action were based.

I am confident that a combination of Africa's political will and the determination and prescriptions of the continent's experts will provide the crucial circumstances under which effective action will be possible. The initiation of the Pan African Tsetse and Trypanosomosis Eradication Campaign, like the Pan African Rinderpest Eradication Campaign before it, demonstrates the viability of translating the spirit of political unity into the reality of collective action to solve a common problem.

Director,

OAU/IBAR,

Nairobi, Kenya.

December 2000
1. Background and Rationale

1.1. The Tsetse and Trypanosomosis Challenge

Tsetse transmitted trypanosomosis in man and domestic animals poses a serious threat to the lives and livelihood of entire communities and constitutes the greatest single constraint to livestock and crop production in Africa.

The World Health Organisation of the United Nations (WHO) reports that over 60 million people in Africa live at risk of getting infected with the disease. Out of the estimated 500,000 people already infected, 25,000 die every year and the situation is rapidly deteriorating, with more than 40,000 new cases being registered every year, excluding the many unreported cases from inaccessible rural and war-ravaged areas.

The Food and Agriculture Organisation of the United Nation (FAO) has estimated that, every year, Africa loses over 3 million cattle and other domestic livestock in deaths caused by trypanosomosis. Approximately 35 million doses of trypanocidal drugs (worth about US$ 35 million) is bought every year in futile efforts to maintain livestock free of the disease. The annual losses directly attributed to trypanosomosis, in reduced meat and milk production and in the costs related to treating the disease or controlling the vector, has recently been estimated at US$ 1.2 billion. This figure rises to over US $ 4.5 billion per year, if losses in potential crop and livestock production attributable to the disease are considered, and excludes the losses attributable to the effects of sleeping sickness in humans.

Tsetse transmitted trypanosomosis is accorded little attention and priority because it is essentially a rural problem, which occurs only in Africa. However, its negative impact on the history and socio-economic development of most of the continent has been very devastating.

Tsetse flies infest about 10 million km$^2$ of fertile land spread across 37 countries on the African continent, from Senegal in the north to South Africa in the south. Areas that are infested with tsetse flies are the most suitable areas for livestock and crop production. These areas, however, are virtually devoid of cattle and other domestic livestock.

Out of the 165 million cattle found in Africa, only 10 million are found within the tsetse fly belt, and these are mostly low producing breeds, which are maintained on high drug management regimes to keep trypanosomosis in check.

Because of the challenge of trypanosomosis, the use of animal draught power in agriculture or transport, and the practice of mixed farming are not well developed in most of Africa. Fear of contracting sleeping sickness and exposing their animals to trypanosomosis continues to prevent people from living in tsetse-infested areas and renders large expanses of land uninhabitable and underdeveloped and leads to overcrowding in the few available tsetse-free areas.

The consequences of tilling the land by hand and trudging long distances on foot; the absence of mixed farming, limiting the availability of animal protein and manure;
the ever impending threat and prospect of disease and death; the futility of working barren soils and herding unproductive livestock, and the combined effect of all this on the history and socio-economic development of the African people is difficult to exaggerate. The limitations imposed by the tsetse and trypanosomosis problem continue to frustrate efforts and hamper progress in crop and livestock production, thereby contributing to hunger, poverty and suffering to entire communities in Africa.

Tsetse fly infestation and incidences of trypanosomosis in man and domestic animals have reached unprecedented levels in various countries. Reports of fly re-invasion into areas that had previously been cleared of tsetse are widespread, and the recorded numbers of cases of the disease in man and domestic animals have reached unprecedented levels. And yet, no vaccine against the disease is available and there are no new drugs being developed. Some of the drugs used to treat sleeping sickness are highly toxic and all drugs currently used to treat animal trypanosomosis have been rendered largely ineffective by widespread drug-resistance. The future availability of the drugs against trypanosomosis is uncertain since their production is threatened with discontinuation for commercial reasons, the only market being in Africa where the purchasing power of the affected consumers is poor and rapidly deteriorating.

1.2. Past Attempts to Control Trypanosomosis
Attempts to control trypanosomosis date back nearly 100 years, employing a range of methods and approaches. Some were aimed at the trypanosome and involved the use of trypanocidal drugs, to treat or prevent the disease, while other intervention
methods were aimed at eliminating the tsetse fly. The initial methods of tsetse control involved clearing the vegetation where the tsetse flies rested, and killing wild game animals on which the flies fed. During the 1940s, 1950s and 1960s campaigns involving habitat destruction and ground spraying of residual insecticides, notably DDT, succeeded in rendering large areas in several African countries (especially Nigeria, Uganda and Zimbabwe) tsetse-free. These campaigns were extensive operations conducted in a military style and performed on a protracted basis.

The many areas in different parts of Africa, in which tsetse eradication had actually been achieved, but which subsequently became re-infested demonstrated the need for an area-wide approach, targeting the infestation in a given area, as well as the need to guard against fly re-invasion from relic fly populations in the control or neighbouring areas. In countries such as Zimbabwe, where an effective national tsetse control capability exists, and where large areas have been cleared of tsetse, the long border perimeter with the neighbouring countries demands regular treatments to control re-invasion and check re-infestation.

1.3. The Area-wide Approach

Experience has shown that protection of even small areas located within a major tsetse fly belt by regular tsetse control interventions is uneconomical. The most viable choice is to employ the area-wide approach, targeting the entire tsetse population(s) in a given area and eliminating it.

There are several examples of past successful area-wide pest and vector management programmes, including the eradication of the screwworm fly from Libya and the United States of America.

In 1955 the WHO embarked on one of the largest are-wide programmes ever undertaken to eradicate malaria worldwide. By 1969 when the programme disintegrated, 74% of the people at risk had been protected, and malaria had been eradicated from 37 countries.

The governments of seven countries of South America (Brazil, Paraguay, Uruguay, Bolivia, Argentina, Chile and Peru) in 1991 resolved to follow the area wide approach and eradicate Chagas disease. As a result, they embarked on a programme to control the bug, which spreads the disease. In 1999 the programme declared absence of Chagas disease in most of these countries, confirming the viability of the area-wide approach for a problem which had persisted when the individual affected countries conducted independent national programmes.

The largest classical biological control programme ever undertaken was performed in Africa in the early 1980s, where it provided an area-wide solution to the devastation caused by the cassava mealybug, using a parasitoid released over 38 affected African countries, to bring the cassava pest under control.

The West African Onchocerciasis control programme brought together 11 affected countries in a collective fight against black flies, which transmit the disease. This collective action succeeded in controlling the problem of river blindness, an achievement that had not been possible through the efforts of individual countries.
The Pan African Rinderpest Eradication Campaign, which is nearing completion, was initiated 12 years ago following a decision by the African Heads of State and Government at a Summit of the OAU. The program has succeeded in bringing the disease under control and is now close to achieving the intended objective of eradicating rinderpest.

As in campaigns against other insect-borne diseases, the most viable approach to stop disease transmission is by eradicating the vector. Compared to the reactive approach of control measures, involving treatment of the disease and limited intervention against the vector, eradication of the vector is a time-limited, once-and-for-all cost. The costs involved in control operations, on the other hand, recur indefinitely. Thus the most viable approach of fighting trypanosomosis is to eradicate the tsetse fly. But, whereas the earlier campaigns against the disease were confidently aimed at tsetse eradication, subsequent emphasis shifted to the supposedly more realistic goals of tsetse control. Later the approaches adopted became less and less decisive, being aimed at containment and management of the disease and more recently, to the resigned goal of living with the disease.

Another successful African programme was completed in 1997, when tsetse flies were declared eradicated from the island of Zanzibar. Following a 3 year campaign involving suppression of the tsetse fly population with insecticide and subsequent aerial release of sterile male tsetse flies over the island, tsetse flies were eradicated and no case of trypanosomosis has since been reported.

The successful eradication of tsetse flies from Zanzibar came at a time when nearly the whole world was getting persuaded to abandon the notion that tsetse eradication was a viable intervention measure, having become mobilised to the resigned view that tsetse eradication is neither achievable nor desirable.

While the technical feasibility of tsetse eradication from Zanzibar was easily conceivable, the prospects of eradicating tsetse flies from Africa’s entire tsetse belt did not inspire confidence in its feasibility. However, the fact that the distribution of tsetse flies over the entire tsetse fly belt is in the form of discrete populations of particular species of tsetse or “islands” whose limits are set by a variety of physical and biological factors, each of which could be independently regarded as Zanzibar, made the proposal for eradication appear feasible.

1.4. The Birth of PATTEC

The escalating incidences of trypanosomosis highlight problems of unsustainability of past approaches to control the disease, and accentuate the significance of the disease in Africa’s desperate struggle against hunger, poverty and disease, creating the urgent need to devise effective methods of coping with the disease.

It was against all this background that the African Heads of State and Government, meeting at the OAU Summit in Lomé, Togo in July 2000, passed the Decision (reproduced below) advocating for the eradication tsetse flies from the continent of Africa.

Tsetse eradication was identified, not only as a viable means to tackle the trypanosomosis problem, but as the missing link to Africa’s recovery as well. Africa’s
most viable contribution to her expanding population and to the rest of the world in the New Millennium is increased agricultural production. The first step towards the development and realization of this option is the removal of the trypanosomosis constraint.

1.5. Decisions made by the African Heads of State and Government in the thirty-sixth Ordinary Session of the OAU Summit, 10-12 July 2000, Lomé, Togo on the Proposal for the Eradication of Tsetse Flies from the African Continent

1. TAKES NOTE of the report presented by the Government of Uganda, and COMMENDS the efforts undertaken to highlight the problem caused by tsetse flies in Africa;

2. COMMENDS those African countries that have initiated the application of the Sterile Insect Technique (SIT) for their pioneering effort;

3. RECOGNIZES the seriousness of the problem as one of Africa’s greatest constraints to socio-economic development, severely affecting human and livestock health, limiting land use, causing poverty and perpetuating underdevelopment on the continent;

4. URGES member states to act collectively to rise to the challenge of eliminating the problem through concerted efforts in mobilising the necessary human, financial and material resources required to render Africa tsetse-free within the shortest time possible.

5. ACKNOWLEDGES the trans-boundary nature of the problem, WELCOMES the establishment of the Pan-African SIT Forum as a mechanism through which sustainable area-wide tsetse eradication can be achieved and CALLS UPON the Secretary-General to provide support to the Pan African SIT FORUM.

6. DECLARES the year 2001 as the year of the control of tsetse fly, to mark the beginning of renewed effort in the campaign for the eradication of tsetse flies in Africa;

7. REQUESTS the Secretary General to undertake all necessary consultations with a view to initiating the campaign from all possible partners and seek their support and co-operation in the implementation of the Pan African Tsetse Eradication Campaign. The Secretary General should submit an annual progress Report to the OAU Summit, through the Current Chairman.

The objective of tsetse eradication was made the collective responsibility of African countries, while the Secretary General of the OAU was entrusted with the responsibility to initiate and lead a Pan African tsetse eradication campaign.

1.6. The Benefits of Tsetse Eradication
The benefits of tsetse and trypanosomosis eradication will include improved human and livestock health, diversified agricultural systems, increased food production and
security and improved livelihood of the community. However, various groups have expressed concern about what they perceive as the negative impact of tsetse and trypanosomosis eradication, including the fear that tsetse eradication could result in overgrazing, land degradation and encroachment on game reserves. Tsetse eradication programmes should therefore include plans and recommendations for land use after tsetse eradication.

2. Pan African Tsetse and Trypanosomosis Eradication Campaign (PATTEC)

2.1. The Vision

The vision of the African Heads of State and Government which inspired their Decision to eradicate tsetse flies and necessitated the declaration of the Pan African Tsetse and Trypanosomosis Eradication Campaign (PATTEC) is:

An African population free from the constraints of trypanosomosis.

2.2. The Mission of the PATTEC Initiative

PATTEC’s mission is to eradicate tsetse and trypanosomosis from the African continent within the shortest possible time. This will be achieved through collective and concerted action by OAU Member States and coordinated by the PATTEC Coordination Office.

2.3. The Mandate of the PATTEC Coordination Office

The mandate of the PATTEC office is to organize and coordinate the campaign for the eradication of tsetse flies and to mobilize the necessary human, financial and material resources required to achieving it.

2.4. The Concept of PATTEC

The Pan African Tsetse and Trypanosomosis Eradication Campaign (PATTEC) is a programme initiated by African countries with an intention to eliminate tsetse and trypanosomosis from the continent within the shortest time possible. The programme comprises an international campaign to institute a process of sustained action through the introduction and support of mechanisms for tsetse and trypanosomosis eradication in affected countries. The campaign is a collective, coordinated effort of African countries, which is set against a background of an urgent need to rid Africa of trypanosomosis and all the constraints and suffering it imposes on the continent, through the eradication of tsetse flies.

3. Overall Strategies and Approaches

3.1. Phased, Area-wide and Sustained Approach

Africa’s tsetse fly belt covers about 10 million km². It is spread over 37 Sub-Saharan countries and contains over thirty species of tsetse flies that live in different habitats
or ecological zones, in areas whose limits are set by a variety of physical, biological and environmental factors.

The eradication of tsetse from the entire tsetse fly belt will be a long-term undertaking, which will be executed through a phased, systematic and sustained campaign to eliminate tsetse flies from individual zones of infestation and create an ever-expanding total tsetse-free area.

Past experience has shown that the problem of re-infestation in tsetse control areas arises either from relic populations of flies that survive control operations or from flies that invade the control area from neighbouring areas. To achieve sustainable eradication, the target tsetse species population in a given area should be isolated, with no possibility of re-invasion into the area by tsetse flies from other areas or re-establishment from surviving relic populations. Therefore the strategy advocated by the PATTEC initiative involves the identification of zones of infestation which are isolated, physically e.g. by mountains, water bodies, etc or by limitations in factors connected with preference and tolerance limits of the fly, e.g. food availability, temperature, humidity, natural cover, etc or where the fly population isolation can be achieved by artificial means. Phased removal of populations confined in each area, one by one, would create ever-expanding tsetse-free areas.

The trans-boundary nature of tsetse fly infestations across national boundaries and the strategic objective of eliminating the tsetse population infesting a particular area make the area-wide approach necessary. The success of any such undertaking, involving different countries, would be predicated on efficient mechanisms of coordination and co-operation between and among the affected countries. The development of one centrally coordinated continental programme, such as is envisaged and advocated by PATTEC, will facilitate this possibility and enhance the management of area-wide approaches. Further, the mandate extended to the OAU Secretary General by the Heads of State and the framework provided under the terms of inter-country agreements witnessed by the OAU will provide the necessary operational environment. The severity of the tsetse and trypanosomosis problem; the availability of human, financial and material resources for an eradication effort; and the availability of data and information required to carry out an eradication campaign, all vary between different countries.

Areas where eradication is attainable, for which the necessary data and information for the preparation of an operational plan of action is accessible, and where the required local and external resources to do the job are available, will be appropriate for selection as candidates for an eradication effort at any one time. Once an area has been selected as a project area, all its portions or sections, that are actual or potential habitats for members of the tsetse fly population(s) in the area, will be addressed with all the necessary eradication measures.

The Pan African Tsetse eradication campaign will start with ongoing and planned eradication projects and proceed to initiate new projects in other priority areas that may be selected. The process of identifying areas and initiating and executing tsetse eradication projects in selected areas will continue in a sustained, systematic manner, one area at a time, until all the areas of Africa’s tsetse belt have been covered and tsetse flies are finally eradicated.
The selection of a particular area for the tsetse eradication campaign will be based on considerations of various criteria that will be established. The criteria will, among others, include: the diversity of tsetse species, the degree of isolation of tsetse fly population(s), the ease of eradication of the species, and the socio-economic importance of the area(s) being considered. A group of appropriately qualified experts will soon meet to determine the criteria for selecting areas in which to embark on tsetse eradication projects.

3.2. Joint, Concurrent and Coordinated Action.

Tsetse eradication efforts of any two or more African member states that have contiguous tsetse infested areas will be conducted jointly and concurrently. To this end, the PATTEC Coordination Office will ensure that national relevant offices and focal points are identified in each of the affected countries. The PATTEC Office will encourage the initiation of tsetse eradication projects and help mediate between affected countries in inter-country meetings and consultations to determine the modalities of cooperation in joint projects.

Even where the management or sponsorship of projects in different countries is separate and unilateral, the planning and execution of tsetse eradication projects will be jointly and centrally coordinated.

The PATTEC Office will also ensure that all major disparities in operational capacities between the countries involved are addressed and that the necessary tsetse and trypanosomosis policies are formulated and harmonized.

Efforts will be made to treat cases of trypanosomosis identified during the implementation of tsetse eradication projects, in cooperation with national governments and other mandated workers in the affected countries.

3.3. Result Oriented and Dynamic Programming Effort

The sub-programmes of the PATTEC will be results oriented; the primary objective and final outcome of any PATTEC project will be the elimination of trypanosomosis through tsetse eradication. During the initiation and approval of a PATTEC project, therefore, emphasis will be put on the establishment of clear and realistic goals as well as the identification of measurable indicators of success. Such projects will also ensure that the various stages of each project are closely linked from beginning to the end to maximise efficiency, avoid stoppages and ensure sustained progress towards the achievement of the desired objective.

The implementation of PATTEC projects will be dynamic so as to allow flexible and responsive planning. Continuous reviews and adoption of appropriate technologies and approaches will be undertaken based on the results of regular monitoring and evaluation of ongoing projects.

3.4. Monitoring and Evaluation of Projects

PATTEC projects will be monitored and evaluated at national, regional and PATTEC Office level to ensure that the implementation of various activities are timely and appropriate and the desired objectives of the eradication effort are attained. This will be achieved either by indirect monitoring and evaluation, through mechanisms such
as reports, or through direct monitoring and evaluation of all project activities. The various indicators established during project design and the overall as well the day to day operational plans of the project will be used as yardsticks of performance during the monitoring and evaluation effort.

3.5. Integration of Appropriate Technologies and Approaches

Experience has shown that no one single technology or approach will result in the eradication of tsetse flies from an area. PATTEC will, therefore, follow an integrated approach and use appropriate combinations of available technologies in the tsetse eradication effort.

Within the context of the PATTEC initiative, efforts will be made to identify, integrate and harmonize existing or planned tsetse and trypanosomosis control and eradication programmes as well as related rural development schemes that add value to or are enhanced by PATTEC activities. This will include the promotion of agricultural development in suitable areas, the linking of ongoing and planned projects with the PATTEC, the detection and treatment of sleeping sickness and animal trypanosomosis, and the provision of support for the development and application of appropriate conventional and new technologies for fly population control and barriers establishment.

3.6. Scientific and Environmentally Friendly Approach

The activities of PATTEC will be supported with appropriate research inputs. This will be achieved through the establishment of a data management unit and the collection, storage, analysis and dissemination of relevant data and information on research. Research needs will be identified and prioritised. Operational research problems and results will be discussed at workshops and meetings. The active involvement of African institutions in solving identified research problems will be encouraged and effective links with international institutions will be established.

PATTEC will follow an environmentally friendly approach. The choice of the intervention methods to be used in the tsetse eradication projects will be based on considerations of their direct and indirect impact on the environment as well as on their cost benefit analysis. Efforts will also be made to develop and encourage land use policies and plans for operational areas to prevent adverse environment effects of post eradication activities. Indicators of adverse environmental changes will be identified during the monitoring and evaluation of environmental changes. PATTEC will ensure that environmental agencies and other concerned environmental stakeholders are consulted and involved in all environmental issues. Every tsetse eradication project will undergo an appropriate Environmental Impact Assessment (EIA) before it is initiated, and environmental monitoring procedures will be performed during project implementation.

3.7. Participatory Approaches

PATTEC will involve and work with all stakeholders (National Governments, Communities, Donors, International Organizations and other Stakeholders) in achieving its objectives. Participation of the major stakeholders will achieve as follows:
3.7.1. National Governments

The direct involvement and participation of National Governments in PATTEC projects will be actively sought through raising their awareness. Consultations and meetings at all levels of government and direct contact with OAU will be arranged and information in form of reports, regular newsletters, brochures, etc describing the PATTEC initiative and its objectives will be made available. Regular meetings and conferences involving governments and the OAU, such as the OAU Summit for the African Heads of State and Government, the Livestock/Agriculture/Health ministers conferences and meetings of the Council of ministers will be used to promote and publicise the PATTEC initiative.

National governments will be involved in the initiation, formulation and approval of new projects as well as in defining national government roles and contributions in national and collaborative projects. Coordinating, monitoring and evaluation of project implementation at the national level, will also be the responsibility of national governments. National governments will make human, financial and material resource contributions to PATTEC trypanosomosis eradication projects.

3.7.2. Communities:

Sustained participation and contribution by communities in PATTEC projects will be ensured through training, motivation mechanisms and awareness raising. Local communities will be encouraged to solicit political support for trypanosomosis eradication initiatives through their political representatives. Local communities will be encouraged to provide material, moral and any other support to PATTEC projects in kind.

3.7.3. Donors:

The PATTEC Office will maintain contact with the donor community and seek their participation and support in the programmes of PATTEC. To this end, the overall programme will be divided into small viable project units for funding purposes.

Attempts will be made to explore the donor world and the approaches used to access funding support. The existing OAU liaison structures and appropriate linkages between donors and national governments will be used to convene meetings with donors on a regular basis. Bilateral agreements between governments and donors to support trypanosomosis eradication projects will be sought. The PATTEC Office will also seek donor participation in the PATTEC initiative through the support of identified Patrons, as well as through effective utilisation of the Office of the Secretary General of the OAU.

3.7.4. International Organisations

International Organizations such as FAO, IAEA, WHO and other active role players involved in trypanosomosis control activities are recognised stakeholders within the PATTEC initiative. Efforts will be made to ensure the full participation and support of these international organisations in all PATTEC efforts. These organisations will also participate in the technical advisory body of the PATTEC Office.
3.7.5. Other Stakeholders (NGOs, Farmers’ Associations, etc.)

All other stakeholders will be identified and efforts will be made to integrate and harmonise their inputs and participation in the context of the PATTEC initiative. This will be done by raising awareness through Public Relations activities and their direct and indirect involvement in field activities such as extension, tsetse control and evaluation.

3.7.6. Private Sector Involvement

Private sector involvement will be encouraged in all aspects of PATTEC. This, among others, will be done through identification of aspects of projects that can involve the private sector, and building capacity of private sector through training and awarding of contracts.

Tenders will be advertised inviting bids from private organisations to be involved in the execution of tsetse eradication projects.

3.7.7. Human Resource Development and Management

The PATTEC Office will ensure that all the human resources needed are available and correctly managed. This will be achieved through the identification of human resource needs using consultants or experts, assessing training needs of appointed staff and identification of mechanisms to retain trained staff.

3.7.8. Public Relations

The PATTEC office will conduct an active public relations campaign in order to raise awareness among all stakeholders and the general public. This will be achieved through the establishment of a public relations / communication unit, the production of printed media such as brochures/news letters/posters, using mass media such as radio/TV/website, lobbying governments, donors, other stakeholders, specific organizations as needed, using prominent person(s) to act as patrons.

3.7.9. Information Management

The PATTEC Office will be responsible for the collection and dissemination of data and information related to tsetse and trypanosomosis programmes. This will be achieved through the establishment of a GIS based data management unit, standardization of data collection and management, establishment of a network for information exchange and the establishing and maintaining a Website.

4. Operational Framework

4.1. Organisation and Structure

4.1.1. The African Heads of State and Government

The governing body of the PATTEC initiative comprises the OAU Heads of State and Government who made the Decision for Africa to embark on a campaign to eradicate tsetse and trypanosomosis from the continent. The Heads of State and Government will be expected to act collectively to provide the necessary support to the initiative. They will be receiving a progress report every year at the OAU Summit meeting through the current Chairman of the OAU.
4.1.2. The Secretary General of the OAU

The Secretary General of the OAU is the person ultimately responsible for initiating and coordinating the tsetse and trypanosomosis eradication campaign. He will make all necessary consultations with all possible partners and seek their support and cooperation in the implementation of the campaign and submit an annual progress report to the OAU Summit through the current Chairman. He will maintain active and regular contact with the PATTEC Coordination Office.

4.1.3. Patrons and the Policy and Mobilisation Committee

The Secretary General will identify high profile personalities, who individually or collectively will help to advance the objectives of the PATTEC initiative, through their advice and influence. Particular emphasis will be placed on contact with African governments, donor countries and international development organisations.

4.1.4. The Tsetse and Trypanosomosis Eradication Campaign

The PATTEC initiative will be organised as a special independent OAU programme under the Secretary General. A PATTEC Coordination Office to organise and coordinate the campaign will be set up within the Inter-African Bureau for Animal Resources (OAU/IBAR), reporting to the Secretary General through the Director of OAU/IBAR. In addition to providing a legal framework to PATTEC, OAU/IBAR will also provide the overall policy, administrative and financial guidance and supervision to the PATTEC Office.

The planning, coordination, monitoring and evaluation of the PATTEC programmes, as well as the day to day administrative and technical activities of the Campaign will be the responsibility of the PATTEC Coordination Office.

4.1.5. Regional and National Coordination Offices

Regional and National PATTEC Coordination Offices will be set up, as the need for them arises, to enhance planning, coordination, monitoring and evaluation of PATTEC projects at the regional and national levels respectively.

4.1.6. Technical Advisory Forum

The PATTEC Coordination Office will have a Technical Advisory Forum composed of representatives of the Pan African SIT Forum, FAO, IAEA, WHO, OAU/IBAR, ISCTRC, and Program Against African Tsetse and Trypanosomosis (PAAT). The Technical Forum will review reports and advise the PATTEC Office on technical issues. The Pan African SIT Forum will provide a mechanism through which the technical requirements of the campaign are identified and made available.

4.2. PATTEC Roles

4.2.1. Identification of Target Areas

Target areas will be identified through the use of geographic information systems (GIS) and other data management systems, information on known density and distribution of tsetse flies, records of human activity and other relevant parameters. A continent-wide confirmatory survey to provide the definitive description of the areas of tsetse fly infestation will be undertaken.
4.2.2. Prioritisation of Areas
Taking into account, inter alia, the following:

- The degree of isolation of tsetse fly populations by natural boundaries or fly populations can be isolated by artificial means. Where such areas in which the fly population is isolated or can be easily isolated, immediate plans should be put in place for a sustained operation towards eradicating tsetse from adjacent areas.

- National and Regional priorities

- Availability of infrastructure for immediate implementation including human, material and financial resources

- Easily controllable species

- Land use pressure.

4.2.3. Project Categorisation for Selection
A clear definition of the projects that need to be considered for implementation under PATTEC will be stated and the criteria for selection clearly outlined.

4.2.4. Project Initiation
Projects will be initiated either by the PATTEC Office or by countries, in line with the agreed prioritisation for identified project area.

PATTEC will facilitate the preparation of project proposals, e.g. through the use of short-term consultancies, with the active involvement of the affected countries.

Projects prepared by countries will be submitted to the PATTEC Co-ordination Office for record and approval.

4.2.5. Project Support
PATTEC will mobilise resources from national and donor sources to implement eradication programmes.

4.2.6. Harmonisation of Different Programmes
PATTEC will integrate, at the conceptual level, the on-going tsetse control programmes to enhance the area-wide and eradication concepts and application. Where countries have already initiated eradication programmes PATTEC will evaluate the projects and where necessary provide technical advice.

4.2.7. Project Implementation
PATTEC will facilitate the formation of co-ordination and management structures to oversee the efficient implementation of regional and national programmes.

4.2.8. Project Appraisal: Monitoring and Evaluation
PATTEC will organize mid-term and end of project evaluations for all PATTEC Regional Programmes. In addition, PATTEC will institute regular monitoring mechanisms with clear indicators.
4.3. Proposed PATTEC Organisational Chart

Key

PP - PATTEC Project
NP - National Project
RPP - Regional PATTEC Project

4.4. Operational Plans

PATTEC will have an annual, short term, medium term and long term plans of operation. The annual plan for the coming year and a medium-term plan of operation covering 10 years are shown below. The long-term operation plan includes any activity that may be undertaken in the PATTEC initiative after ten years of the programme, and a provision has been made for such a plan as part of the 10 year plan. The annual and short-term operational plans of the PATTEC will consist of project activities that have been initiated either by the PATTEC office or by one or more African Member States.

PATTEC’s annual plan of operation for the year 2001 (see table below) focuses on strengthening and coordinating existing tsetse eradication efforts in East and West Africa in light of the current efforts to eradicate tsetse from the African continent.

This concept note and plan of action will be finalised during January, when all the available factual information are included. During this same period, the OAU/IBAR will also set up the PATTEC Co-ordination Office. The PATTEC Office will then identify focal points within countries to enhance the work and process of coordinating and implementing projects.
Harmonization of on-going or planned programmes with the concept and objective of the PATTEC initiative will be done through meetings and consultations between OAU and the management of the projects in question.

Harmonisation will also be sought in meetings and consultations with international organizations active in the fields of tsetse and trypanosomosis control, to determine areas of cooperation, avoid duplication and enhance synergy.

Efforts will be made to raise funds for the short-term PATTEC operational plans. Other activities will include: the determination of medium and long term PATTEC activities; launching of public awareness campaigns; undertaking of popularization and consultation missions; identification and appointment of Patrons; holding of meetings between managers of existing projects and integration of existing projects to PATTEC.

A group of appropriately qualified experts will meet to determine the criteria for prioritising areas in which to initiate eradication operations. New projects will be prepared by groups of consulting experts, identifying and evaluating the requirements as well as the strategies and procedures for tsetse eradication in selected project areas.

Regional and national coordination offices will be set up as required, depending on the number of active projects requiring coordination.

Efforts will be made to make use of the Secretary General's office as well as the governments of Member States in to raise the necessary financial support for the projects, through continued lobbying and promotion of awareness about the problem of trypanosomosis and the benefits that will accrue from its total elimination.
### 4.5. The First Year of the PATTEC Initiative (2001)

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>TIMEFRAME</th>
<th>IMPLEMENTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Finalize concept note and Plan of Action</td>
<td></td>
<td>OAU / IBAR</td>
</tr>
<tr>
<td>2. Set up the PATTEC Coordination Office</td>
<td></td>
<td>OAU / IBAR</td>
</tr>
<tr>
<td>3. Establish criteria for priority areas</td>
<td></td>
<td>OAU / IBAR / PATTEC</td>
</tr>
<tr>
<td>4. Identify focal points within countries</td>
<td></td>
<td>OAU / PATTEC</td>
</tr>
<tr>
<td>5. Establish data and information system at the PATTEC Office</td>
<td></td>
<td>OAU / IBAR / PATTEC</td>
</tr>
<tr>
<td>6. Undertake popularization and consultation missions</td>
<td></td>
<td>OAU / PATTEC</td>
</tr>
<tr>
<td>7. Launch public awareness campaign</td>
<td></td>
<td>OAU / IBAR / PATTEC</td>
</tr>
<tr>
<td>8. Draw up plans with national governments</td>
<td></td>
<td>OAU / PATTEC</td>
</tr>
<tr>
<td>9. Determine future PATTEC activities</td>
<td></td>
<td>OAU / IBAR / PATTEC</td>
</tr>
<tr>
<td>10. Hold harmonization meetings with international organizations</td>
<td></td>
<td>OAU / IBAR / PATTEC</td>
</tr>
<tr>
<td>11. Identify and appoint Patrons</td>
<td></td>
<td>OAU / IBAR / PATTEC</td>
</tr>
<tr>
<td>12. Design, initiate projects and secure funding e. g. Lake Victoria, Zimbabwe, West African Cotton Belt</td>
<td></td>
<td>OAU / IBAR / PATTEC</td>
</tr>
<tr>
<td>13. Raise funds for future PATTEC activities</td>
<td></td>
<td>OAU / PATTEC</td>
</tr>
<tr>
<td>14. Hold meeting of managers of existing projects</td>
<td></td>
<td>OAU / IBAR / PATTEC</td>
</tr>
<tr>
<td>15. Integrate existing projects</td>
<td></td>
<td>OAU / IBAR / PATTEC</td>
</tr>
<tr>
<td>16. Present concept note to OAU Summit</td>
<td></td>
<td>OAU / IBAR / PATTEC</td>
</tr>
<tr>
<td>17. Carry out preparatory activities and officially launch PATTEC</td>
<td></td>
<td>OAU / IBAR / PATTEC</td>
</tr>
<tr>
<td>18. Present PATTEC to ministers of agriculture/livestock/health</td>
<td></td>
<td>OAU / IBAR / PATTEC</td>
</tr>
<tr>
<td>19. Submit programs, plans and progress report of existing projects</td>
<td></td>
<td>OAU / IBAR / PATTEC</td>
</tr>
<tr>
<td>20. Harmonise cross border activities</td>
<td></td>
<td>OAU / IBAR / PATTEC</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ACTIVITIES</th>
<th>YEAR OF ACTIVITY</th>
<th>IMPLEMENTER</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1    2  3  4  5  6  7  8  9  10</td>
<td>OAU/IBAR/PATTEC</td>
</tr>
<tr>
<td>1. SEARCH FOR LONG TERM FUNDING FOR PATTEC OFFICE</td>
<td>X     X</td>
<td>OAU/IBAR</td>
</tr>
<tr>
<td>2. APPOINTMENT OF PROFESSIONAL STAFF</td>
<td>X</td>
<td>PATTEC</td>
</tr>
<tr>
<td>3. INTEGRATE EXISTING PROJECTS WITH PATTEC</td>
<td>X     X</td>
<td>OAU / PATTEC / MEMBER STATES</td>
</tr>
<tr>
<td>4. DRAW PLAN WITH NATIONAL PROJECTS</td>
<td>X     X</td>
<td></td>
</tr>
<tr>
<td>5. DESIGN, INITIATE PROJECTS AND ARRANGE FUNDING</td>
<td>X     X</td>
<td></td>
</tr>
<tr>
<td>6. MONITOR AND EVALUATE PROJECTS</td>
<td>X     X</td>
<td></td>
</tr>
<tr>
<td>7. DEVELOP PLAN FOR THE NEXT TEN YEARS</td>
<td>X     X</td>
<td></td>
</tr>
<tr>
<td>8. IDENTIFY FOCAL POINT IN COUNTRIES</td>
<td>X     X</td>
<td></td>
</tr>
<tr>
<td>9. HARMONIZE CROSS BORDER ACTIVITIES</td>
<td>X     X</td>
<td></td>
</tr>
<tr>
<td>10. DEVELOP PROCEDURES MANUALS</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>11. PROMOTE AGRICULTURAL DEVELOPMENT</td>
<td>X     X</td>
<td></td>
</tr>
<tr>
<td>12. ESTABLISH AND MAINTAIN DATA BASE</td>
<td>X     X</td>
<td></td>
</tr>
<tr>
<td>13. IDENTIFY APPROPRIATE RESEARCH NEEDS</td>
<td>X     X</td>
<td></td>
</tr>
<tr>
<td>14. RAISE AWARENESS AMONG POLICY MAKERS</td>
<td>X     X</td>
<td></td>
</tr>
<tr>
<td>15. STRENGTHEN NATIONAL CAPACITIES AND CAPABILITIES</td>
<td>X     X</td>
<td>PATTEC/OAU</td>
</tr>
<tr>
<td>16. CONDUCT WORKSHOPS AND TRAINING FOR INFORMATION EXCHANGE AND DISSEMINATION</td>
<td>X     X</td>
<td>Projects</td>
</tr>
<tr>
<td>17. SUBMIT PROGRAM, PLANS, AND PROGRESS REPORT OF EXISTING PROJECTS</td>
<td>X     X</td>
<td>Projects</td>
</tr>
</tbody>
</table>
4.7. Estimated Budget for the PATTEC Co-ordination Office

- Estimates based on the assumption that the PATTEC Coordination Office will be established in Nairobi, at the OAU/IBAR Offices in Maendeleo House on Monrovia Street.
- Initial space requirement of 3 offices and a boardroom for meetings, also to serve as a reference section and provide sitting space for short term consultants.
- Items required: 4 PC computers each with printer, facilities for E-mail and internet connection; telephone with exchange and extensions to 4 locations; photocopier; items of furniture, including lockable cabinets, chairs, tables, shelves; fittings and furnishings; motor vehicles (2); visual aids equipment, including TV, video, slide projectors (overhead, slide and data); desktop publishing equipment for the production of documents and publicity materials.
- Salaries for project staff: Initially the PATTEC Coordination Office will hire the following staff:
  - Coordinator (Programme Manager)
  - Administrative Assistant (Office management and finances)
  - Information and Data collection, storage and dissemination
  - Driver / Messenger

- Short Term Consultancies and Expert Group Meetings
  - Establishment of criteria for selection of areas for tsetse eradication projects; including the identification of the appropriate areas in which to locate Centres of Excellence to boost the technical and operational capacity of the affected countries in the eradication campaign, e.g. mass-rearing centres, diet preparation centres, testing and analytical centres, etc.
  - Writing of new tsetse eradication projects, notably: the G. f. fuscipes belt around L. Victoria; project in Zimbabwe; project in the Cotton Belt of West Africa, etc.
  - Establishment of data and information management system at the PATTEC Office
  - Determination of the requirements of the PATTEC initiative
  - Preparation of Public Awareness and promotional materials
  - Harmonisation and integration of on-going and planned projects to support or complement the concepts and strategies of the PATTEC initiative

- Meetings and Consultations
  - Secretary General’s consultations with member states, mandated organisations and donors
  - Meeting of the managers of on-going and planned projects
  - Meetings of line Ministers on PATTEC issues

- Provision of Administrative support to OAU
- Provision for office space rent
- Travel and Missions of officials of OAU and others for PATTEC
- Establishment of monitoring and coordination structures and systems for existing eradication projects, including:
  - The Southern Rift Valley project in Ethiopia (G. pallidipes)
  - The Lambwe Valley tsetse project in Kenya (G. pallidipes)
  - The Buvuma Islands Project in Uganda (G. f. fuscipes)
  - The Mafia Island project in Tanzania (G. brevipalpis)
  - The Bamako Project in Mali (G. p. gambiensis)
### 4.8. Budget Estimate for PATTEC Activities during 2001

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>BUDGET LINE ITEM</th>
<th>QUANTITY</th>
<th>TOTAL COST US$</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>EQUIPMENT</td>
<td>Computers, Printers, modem &amp; accessories.</td>
<td>4</td>
<td>15,600.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Telephone</td>
<td>4</td>
<td>1,700.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fax</td>
<td>1</td>
<td>900.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Photocopier</td>
<td>1</td>
<td>9,100.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Office Cabinets</td>
<td>4</td>
<td>1,600.</td>
<td></td>
</tr>
<tr>
<td>FURNITURE</td>
<td>Tables, chairs, desks, shelves</td>
<td></td>
<td>7,300.</td>
<td>Estimates based on requirements for 3 offices with one boardroom for meetings</td>
</tr>
<tr>
<td>VEHICLES</td>
<td>Landrover</td>
<td>1</td>
<td>42,000.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Toyota</td>
<td>1</td>
<td>32,500.</td>
<td></td>
</tr>
<tr>
<td>OFFICE ADMINISTR.</td>
<td>Coordinator</td>
<td>1</td>
<td>120,000.</td>
<td>Estimates include office running costs, vehicle insurance and running costs, sundry costs to establish the office and insurance for office equipment.</td>
</tr>
<tr>
<td></td>
<td>Admin. Asst</td>
<td>1</td>
<td>23,800.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Info. &amp; Data</td>
<td>1</td>
<td>28,900.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Driver</td>
<td>1</td>
<td>7,3000.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Insurance &amp; running cost</td>
<td></td>
<td>50,000.</td>
<td></td>
</tr>
<tr>
<td>OPERATIONS</td>
<td>Meetings &amp; W/S</td>
<td>4</td>
<td>156,000.</td>
<td>The activities for which these estimates are made were identified above, under 4.7.</td>
</tr>
<tr>
<td></td>
<td>Consultancies</td>
<td>6</td>
<td>203,000.</td>
<td>The numbers shown in the 3rd column refer to the events, times, assignments or missions involved in the particular activity.</td>
</tr>
<tr>
<td></td>
<td>Preparation of New projects</td>
<td>4</td>
<td>149,000.</td>
<td></td>
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<tr>
<td></td>
<td>Consultations by OAU Sec. Gen.</td>
<td>10</td>
<td>85,000.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-Data &amp; Info. est.</td>
<td></td>
<td>17,000.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-Public Relations</td>
<td></td>
<td>27,000.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-Travel/ Missions</td>
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<td>57,000.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-Launching PATTEC</td>
<td></td>
<td>23,000.</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td></td>
<td>1,057,700.</td>
<td></td>
</tr>
</tbody>
</table>
A meeting of the Task Force to formulate the Concept and Plan of Action for the Pan African Tsetse and Trypanosomosis Eradication Campaign (PATTEC) was held at the Kenya College of Communications Technology (KCCT), Nairobi, 11th–15th December 2000.

Sitting Row L – R    Salem Abraham (Rapporteur), Sadou Maiga (Mali), Margaret Mnzava (Secretariat – OAU), H. G. B. Chizyuka (FAO-Accra), Mary Owaga (Rapporteur), Solomon Haile-Mariam, (OAU), Marie Rwamushaija (Secretariat OAU), Charles Mahama (Ghana).

1st Standing L – R    Kebba Jarfu (Translator), J. Mathu Mdungu (Kenya), C. Assogba (Translator), William Shareni (RTTCP/SACD Regional Centre – Zimbabwe), I. Sidibe (Burkina Faso), Rob Bagnall (South Africa), Asseta Mebrate (Ethiopia), A. Msangi (Tanzania).

2nd Standing L – R    T. K. Philemon-Motsu (Botswana), J. P. Kabayo (OAU), Francis Olco (Kenya), Martin Ranaivoson (Translator OAU), Charles Nkurangah (Rwanda), L. M. Ogwal (Uganda), Victorin Cojia (Benin), Daudi Wathaka (Moderator), Abou Bado (Burkina Faso)