1.

Reducing/Eliminating the use of POPs pesticides and selecting alternative management strategies: a roadmap

As described in the introductory chapter, one needs to look beyond mere replacement of POPs pesticides by other pesticides to more sustainable alternative practices based on integrated management principles. Achieving better health and environment through such integrated strategies requires the participation of a wide range of national and international institutions, organizations, commercial companies and individuals.

People working in agricultural production, public health and building construction and maintenance need to develop and make use of new pest management strategies. Another important group consists of consumers and their organizations, who can make demands for safer products and services. An obvious prerequisite for success is a favourable policy and regulatory environment. Governments, NGOs, donors, international organizations and other institutions have the responsibility to encourage and set the framework for a transition away from hazardous and undesirable products and practices.

This chapter will lead the reader through a series of questions and illustrative conclusions, supported by pertinent information, to provide guidance for a first analysis of a specific situation. It is suggested to read the support information before moving to the next indicated question, even if in a first instance you feel you know the answer. A word of caution: the "roadmap" is obviously an over-simplification, and detailed answers will not be provided. It is, however, anticipated that this chapter will provide entrance points for further discussions. The flow-chart on the fold-out at the back of the document summarises the main issues of the roadmap.

The roadmap

1. Do you know or suspect POP pesticides are being used in your country?

No – go to point 2
Yes – go to question 3

This question is easier to answer if POP pesticides are in predominantly legal use, for example in vector control programmes, and the extent of their use (production and imports) may be available in official statistics. Agrochemical companies should also be able to provide information, but care should be taken that commercial interests do not introduce bias into the assessment.

Local knowledge, community contacts, direct observations and interviews with traders and dealers can give information on which pesticides are being used and for what purpose. Accumulations of empty containers at various sites may also be an indication of usage of the chemical(s) in question. The household use of pesticides and repellents should not be overlooked. A complicating factor can be that not everyone may be aware which substance they are actually dealing with. "DDT" is sometimes used as a popular generic term for any pesticide. Chemical analysis may be essential to determine the nature of a formulated pesticide. This highlights the importance of the availability of analytical facilities.

A review of documented imports and/or use in the past may provide leads concerning current less visible uses. Such information may be available from a number of ministries, from international organizations and sometimes from industry. Chemical residue analysis can also help answer the question. An example where actual usage may be suspected comes from Africa: analyses of marketed cereals in a West African country showed residue levels of aldrin, dieldrin and DDT much above what would be expected from background contamination, and above FAO maximum residue levels, in 22 – 29% of samples (Osibanjo and Adeyeye, 1995).

2. Monitoring

Even if no evidence of POP pesticide use can be found – whether legal or illegal – it is still important to continue monitoring as long as these substances are produced or used elsewhere.

An example:
On several brands of mosquito coils imported into a number of countries in recent years, the labels did not mention any active ingredients. It was eventually found that the coils contained up to 10% DDT, a pesticide banned in these countries. Import would never have taken place, had this been known (Yen and Kalloo, 1998).

3. Is their use illegal or legal?

It is illegal – go to point 4
It is legal – go to question 5

Relevant government authorities can provide information on the legal status of POP pesticides. The authority responsible for pesticide registration varies from country to country[1]. The registration of pesticides for use in agriculture and of those for use in public health campaigns may also reside under different authorities. International agencies (UNEP, FAO) regularly review the legal status of pesticides in their Member States.

[1] For information on authorities, see: Royal Society of Chemistry. 1996. *World Directory of Pesticide Control Organisations*, Third Edition (compiled by G. Ekström).

4. Illegal use

Illegal use of POP pesticides can occur for a number of reasons:

- Countries may lack the resources, commitment and/or infrastructure to implement and enforce legislation.

- Information on restrictions or bans have not reached everyone concerned – local pesticide dealers, health personnel, extension workers, farmers, etc.

Training projects should be conducted to sensitise and inform these groups on relevant legislation and other aspects of pesticide management.

Sources for illegal use of POPs pesticides may include:

- Stocks of obsolete pesticides

There are considerable, often poorly managed, stocks of obsolete pesticides in many developing countries. A significant part of these stocks are POP pesticides and some of these may find their way to the illegal market.

Immediate action required includes containment of the stocks to ensure that they are neither used, nor threaten the environment. Disposal plans must then be drawn up and implemented. For a further discussion on obsolete pesticides, see sections 3.4 and 4.12.

- Diversion of legal stocks to illegal use

It may be legal to import or produce some POP pesticides with restricted uses, e.g. only for vector control. These pesticides will then be available in the country, presenting a significant risk that parts of the legal stocks will be diverted to illegal purposes, e.g. crop protection, see chapter 2 (pages 37 and 38).

- Illegal imports

Regional co-operation can help counteract smuggling. Efficient implementation of the Rotterdam Convention (formerly the PIC procedure) will also assist governments in stopping unwanted imports. Information sources are provided in annexes 3 and 4.

5. Why are POP pesticides still used?

Alternatives are considered too costly – go to point 6
Alternatives are considered ineffective – go to point 7
There is insufficient public awareness – go to point 8

Cost and effectiveness are sometimes closely related. Using a pesticide with weaker or shorter effect may lead to higher application rates and/or more frequent treatments – and higher costs. Replacing DDT with other pesticides for indoor residual treatments may, for example, also require operational changes. More frequent treatments need to be made with some alternative pesticides, while others, such as the modern synthetic pyrethroids, have a residual activity comparable to that of DDT. As they are less bulky, operational problems may be even smaller. A thorough analysis of each situation is always required.

Countries that are economically dependent on the export of agricultural products to countries with strict pesticide residue standards have often already phased out more

persistent pesticides. In at least one country in southern Africa, for instance, the decision to interrupt the use of DDT for malaria vector control was made under pressure from the tobacco growers.

6. Costs of alternatives

There may be different reasons for the perception that alternative approaches are too costly:

- Often, not all costs of current practices are considered or the costs of alternative approaches may be overestimated. The costs of pesticide impacts on health and environment have hitherto been neglected in economic analyses, but it is now increasingly accepted that these factors also must be taken into account. See also sections 3.2 and 4.1.

- Economic concepts such as discounting the cost of expenditures in the future may favour certain interventions over others at the expense of sustainability. For example, in economic evaluations comparing capital-intensive environmental management measures of an infra-structural nature with a programme of recurrent spraying interventions for disease vector control, a high discount rate will tip the balance in favour of the latter option. For more information see WHO, 1986 and Phillips *et al*., 1993.

- Alternative pesticides may need to be imported into a country with domestic production of POP pesticides, imposing a burden on the balance of trade, creating a political predicament over real or perceived risks of employment loss and preventing recovery of investments in production facilities. A government or a company may therefore be reluctant to favour alternatives, and this might be reflected in prices, tax and duty policies, marketing, etc.

  Several African countries are in the process of changing import policies so that material for mosquito nets will be exempt from import duties aimed at protecting the local textile industry. A similar exemption for pyrethroids intended for the impregnation of mosquito nets may follow. More information can be found on the *Roll Back Malaria* web site http://mosquito.who.int/cgi-bin/rbm/home.

- Production of older pesticides, such as the POPs, is usually cheaper than production of newer, less hazardous ones. To lessen the difference, companies can, on a voluntary basis, decide to decrease profit margins on “alternative” pesticides if this will encourage a shift away from unsuitable (POP) pesticide use in low-income countries. A parallel is the case of pharmaceuticals, where producers have opted for lower prices on certain medicines against tropical diseases and HIV/AIDS.

Continue to point 9 in this chapter for a further discussion on replacing POP pesticides.

7. Efficacy of alternatives

Effective alternatives to all POP pesticides are available. Nevertheless, lack of knowledge about alternative approaches is a major constraint to their adoption.

Distrust of the efficacy of alternative approaches, including alternative pesticides, may have different backgrounds:

- Long reliance on residual pesticides in vector control has created expectations that alternatives should have the same, singular, 'silver bullet' characteristics. Non-chemical methods of vector control are, therefore, often rejected outright. Tailor-made packages of control methods in specific settings will only work if clear decision-making criteria and procedures are designed to support integrated management including chemical, biological and environmental management measures as appropriate.

- Access to information is essential and improving it is, in fact, a major challenge if the pattern of pesticide use is to change. Schools and universities need to ensure that curricula cover information on alternatives and that staff are fully aware of available options. Public sector and NGO workers in agriculture, health services and development in general may need in-service training. Success stories from other countries can provide information and inspiration. A few such stories are presented in chapter 4.

  For those with access to the Internet, many information sources can now be reached. UNEP's POPs website (http://chem.unep.ch/pops/) maintains an information system on POPs and alternatives, a collection of studies and action plans for eliminating/reducing releases of POP, and provides links to other relevant sites[2].

- When an attempt is made simply to replace a POP pesticide having long residual activity by another pesticide with shorter effect, re-treatments may be needed more often. This can be illustrated by the case of termite protection of buildings, where no non-POP pesticide alternative of comparable residual effect is available. This is one factor which has led to termites now being controlled using multi-pronged, integrated approaches. (For more information on termites, see termites, see sections 3.7 and section 4. 7).

- Pilot projects have been shown to be an effective and convincing method to generate knowledge and spread information. The Farmer Field School and Farmer Participatory Research approaches have been highly successful in reducing reliance on pesticides and introducing Integrated Pest Management in China, Indonesia, the Philippines, Viet Nam and several countries in Africa. More information on this is found in chapters 2 and 3. If such projects are adequately funded, exchange visits of local participants (and not just officials and scientists) between projects can be made. This will enhance their impact even further.

8. Insufficient public awareness

Public awareness of the hazards that POP pesticides pose to the health of present and future generations as well as to the environment is often lacking, particularly in developing countries. Pesticides are seen as inherently benign, in the same way that medicines are. (Many local languages even use the same word for "pesticide" and "medicine"!). Wide-scale information and training is needed to increase the level of caution and gain support for restrictions and bans.

[2] For more information on IPM and Farmer Field Schools see: http://www.communityipm.org and http://www.fao.org/WAICENT/FAOINFO/AGRICULT/AGP/AGPP/IPM, for malaria and IVM see: http://www.psr.org/malaria_handbook.htm. (More websites and other information sources are listed in annex 4).

It is important that the information reaches all groups, including women and children. Women are usually responsible for the health of the family, and carry a heavy burden in agriculture. Unborn children and infants are particularly vulnerable to toxic effects of pesticides. Children also work in agriculture, and, even more important, are the "keys" to the attitudes of future generations! Training of schoolteachers and provision of appropriate teaching materials is therefore vital.

9. A situation where a POP pesticide is being used has been identified, and an alternative strategy is now to be developed and/or applied. Nearest at hand is often just to look for a replacement pesticide. But - is there actually a need for substitution of POPs pesticides with other pesticides ?

No – go to point 10
Yes – go to point 11

Many pesticide applications are still carried out on a routine basis, or just as an often misconceived insurance, without the need having been determined in advance. This incurs unnecessary costs on already strained private or public financial resources, and puts an unnecessary burden on health and the environment.

A first priority must therefore be to critically assess the field situation based on an understanding of the local ecology. In situations where farmers have been trained to improve their knowledge of agro-ecosystems they can make informed decisions based on observation and analysis of the actual field situation. This is the basis of the Farmer Field School approach, which has found wide acceptance in many countries. More on this subject can be found in chapters 2 and 3.

10. The decision if and when to use pesticides should be taken in the context of an integrated approach.

Ecosystem observation and analysis are the basis for making informed decisions on pest and vector management. A range of methods exists for managing pests and vectors. Preference is then given to non-chemical methods, with chemical pesticides being used as "last resorts". For a further introduction to integrated approaches, please go to chapter 2. Case studies of malaria control without pesticides, of IPM experiences and of termite management are presented in chapter 4.

11. Though there are many benefits in avoiding the use of pesticides, situations will occur when the risks of pesticide treatments are outstripped by the likely benefits.

It must be realised that there can be no simple-to-use table of "replacement pesticides for POPs". Each substance, and even formulation, has its own properties.
In choosing a pesticide and application method in a specific situation, a number of factors will have to be assessed:

- The pesticide must be approved in the country of use and recommended for the intended purpose. Recommendations based on relevant local or regional research should be available. Labelling and packaging should fulfil national and international (FAO and WHO) standards (see the annex for references).

Pesticides that have high acute or chronic toxicity, or are potentially harmful to the environment, should only be used in emergency cases, when no other alternatives are available. The amounts applied should be minimised by the complementary use of non-chemical measures.

WHO has classified pesticides according to acute health hazard, and pesticides placed in the three highest categories (Ia, Ib and II) should not be recommended. Pesticides rated as "carcinogenic to humans" or "probably carcinogenic" (IARC 1 and 2A; USEPA B1 and B2) should be avoided. The same applies to pesticides in the PIC procedure/Rotterdam Convention, see table A4 in the annex. Lastly, evidence in recent years points to the endocrine disrupting properties of several pesticides (POPs as well as non-POPs), and even if a specific classification scheme is not available, this should be factored in. Please refer to the annex for suggestions on relevant information sources on pesticides (Tomlin, 2000).

- The risk of inducing or increasing pesticide resistance should be taken into account when pesticide use is among the control options under consideration. Resistance will eventually render a pesticide useless. As the number of acceptable pesticides decreases, there is a looming risk that the overall intensification of their use combined with the effect of their further uncoordinated application by different economic sectors will increase the pressures that lead to resistance. Only stepped-up advocacy of the notion that our decreasing arsenal of pesticides consitutes a valuable resource for future generations to deal with pest and vector emergencies may modify this trend in resistance development. A further discussion of pesticide resistance can be found in section 3.3.

- No pesticide should be recommended if appropriate and affordable protective gear is not available, and unless the use of this gear can be ensured. Persons applying pesticides should have undergone training to reduce risks associated with their use and handling, as required. Training and licensing of pesticide dealers should be made mandatory.

- An appropriate pesticide formulation and application method should be chosen. Different formulations of the same active ingredient may not have the same hazard to users. Granular formulations, for example, are often safer and require fewer protective measures than liquid formulations.

- Only good quality pesticides should be used. Over 30% of pesticides marketed in developing countries do not satisfy international standards. They may contain impurities or other undeclared substances, or too much or too little active ingredient. Using sub-standard pesticides leads to poor control, higher costs, increased risk to users and unnecessary releases into the environment (Kern and Vaagt, 1996).

- Large scale purchases of pesticides, for example for vector control operations by public health authorities, should only be made from companies pledging "cradle-to-grave product stewardship", meaning, *inter alia*, that the company will take back unused quantities for re-sale or environmentally sound disposal. This is an important measure to safeguard against accumulation of unmanageable stocks of obsolete pesticides.

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