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DESK STUDY ON THE EVALUATION OF METHYL BROMIDE PROJECTS

TABLE OF CONTENTS

I. Executive summary

1. The evaluation of methyl bromide (MB) projects is part of the 2012 monitoring and evaluation work programme, which was approved at the 65th meeting of the Executive Committee as per decision 65/9. The reason for the evaluation is that while about 90 per cent of MB consumption in Africa has been phased out, several countries have expressed concerns that alternatives adopted through investment projects are not sustainable in the long term, and there is a risk of returning to MB use.

2. A desk study was undertaken with the aim of characterizing, to the best extent possible, constraints and hurdles to the adoption of alternatives to MB in African countries, taking into account the different kinds of stakeholders and use sectors involved. It considered historical consumption of MB in Africa, the phase-out achieved, and factors influencing the sustainability of the alternatives adopted. Key factors affecting sustainability of the phase-out and issues needing further analysis were studied. Comments received from the implementing agencies, national ozone units (NOUs), Compliance Assistance Programme (CAP) officers and other key stakeholders were considered.

3. The Multilateral Fund has conducted several evaluation studies on the performance and impact of MB projects in Article 5 countries including low-volume consumers (LVC) (defined as countries with reported consumption of less that 5 ODP tonnes of MB), with the aim of identifying specific factors influencing the success of phase-out and its long-term sustainability. MB projects are complex and unique, quite different to those of the industrial sector; the sustainability of the alternatives adopted is less guaranteed by changing the equipment or technology previously used, since it depends on the technical and commercial viability of such alternatives and the enforcement of production, import and use restrictions. Farmers could always, even for one season, go back to using MB if this seemed more advantageous for any reason. Reluctance to change is often a barrier to long-term adoption of alternatives. The fact that MB cannot usually be replaced by one single and equally effective alternative implies that growers and other stakeholders have to change their approach to production and process management.[1] This relates mostly to integrated pest management (IPM) but also time management as alternatives often require longer exposure times than MB.

4. After Eastern Europe, Africa is the Article 5 region showing the most rapid phase-out rate of MB with present consumption amounting to about 11 per cent of the total aggregate consumption for Article 5 countries. MB consumption has traditionally concentrated in about ten countries and a few use sectors. Phase-out projects funded by the Multilateral Fund have been implemented in all large consuming countries in Africa except South Africa.

5. Previous evaluations conducted by the Multilateral Fund determined that technology choice for the projects was generally appropriate and had been supported with demonstration trials, following discussion with key stakeholders. However, instances were identified where advanced technologies had been implemented or equipment delivered without a solid examination of their technical or economic sustainability.

6. Demonstration projects generally provided the basis for trialling alternatives and selecting those best suited for the particular circumstances of the ensuing investment project. Experiences acquired with similar sectors and regions and involving key stakeholders were critical in the acceptance and commercial adoption of alternatives. Recent projects have more efficiently addressed economic feasibility, as it impacts commercial adoption of the selected alternatives. Several projects are also addressing registration of chemical alternatives, with the implementing agency contributing to the process when possible, thus ensuring that alternatives showing promising results are commercially available.

[1] http://www.multilateralfund.org/sites/46/Document%20Library2/1/4607.pdf

7. Africa is the Article 5 region with the highest number of technical assistance (TAS) and technology transfer (TRA) projects. Some involved workshops or surveys of MB consumption and use, while others comprised more widespread training and dissemination activities, including educational materials. Their overall goal was to raise awareness about the MB phase-out, provide information on alternatives, identify and involve key consuming sectors and stakeholders, and prevent potential expansion of MB consumption. Often, these projects were approved on the understanding that the country (or region) where they are implemented will not seek additional funding from the Multilateral Fund for the phase-out of MB.

8. In general, the project reports and documents refer to the appropriateness/sustainability of the alternatives selected, and this issue is considered with the relevant stakeholders. Actual or potential factors impacting the commercial adoption of alternatives include availability of services and supplies to guarantee appropriate maintenance of the technologies selected, sufficient training and familiarity with new technologies and possibilities of continued training and access to new developments.

9. Factors impacting the technical sustainability of alternatives implemented include efficacy of chemical alternatives and possible development of pest resistance, costs, commercial availability, difficulties with registration and international bans on certain chemicals which can impact exports. Illegal trade and increasing demand of MB for quarantine and pre-shipment (QPS) that could be diverted to controlled uses were also noted.

10. All projects funded by the Multilateral Fund include an agreement between the relevant government and the Executive Committee to maintain the phase-out achieved and, generally, to not request any further funding for MB phase-out. In many cases a commitment to issue legislation banning MB in the country is included.

11. Regional strategies seem appropriate to support phase-out efforts, particularly to avoid the perception that a country where use of MB is still allowed is at an advantage over another that has phased out. Awareness-raising efforts and sharing experiences strengthen the replacement of MB. More thorough involvement of NOUs, trade associations, research centres, and local or regional extension/academic institutions and experts is necessary, particularly at the technical level. Difficulties sourcing supplies locally and finding appropriate maintenance services for certain technologies need to be addressed with key stakeholders and fixed when possible. Non-chemical alternatives or at least reducing dependence on chemicals through further implementation of IPM programmes should be encouraged.

12. In the wake of critical use nominations (CUNs) being allowed for Article 5 countries, it is important to clarify whether MB use is banned in countries where phase-out has been completed, as per the usual country agreements. Disadvantages of extending the phase-out and embarking into the CUN process need to be explained, and market headway made by those that are able to sustain the phase-out should be highlighted. Environment-friendly production practices are increasingly important especially in Europe, which is the main importing market for African produce and this must not be overlooked.

13. A follow-up evaluation, including field visits to five or six key countries for more in-depth analyses of the issues governing sustainability of alternatives is suggested, with the aim of assessing and characterizing actual risks or reverting to MB use. In addition, further information may be obtained by conducting face-to-face interviews with ozone officers on the margins of the coming meeting of the Open-ended Working Group (OEWG).

II. Background

14. At its 65th meeting the Executive Committee decided to conduct an evaluation of MB projects undertaken in Africa, with the aim of assessing progress made in phasing out MB and the sustainability of the phase-out achieved in the face of the final phase-out deadline for Article 5 countries of 1st January 2015. In addition, the evaluation addresses decision XXIII/14 of the Twenty-Third Meeting of the Parties the Montreal Protocol, which requests the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol "…to consider requesting its Senior Monitoring and Evaluation Officer, when carrying out the evaluation approved at its sixty-fifth meeting on methyl bromide projects in Africa, to consider options for a strategy to achieve the sustainable use of effective alternatives to methyl bromide in Africa."

15. Very soon after MB was declared an ozone-depleting substance (ODS) in 1992, the Multilateral Fund recognized the importance of phasing out MB and begun to fund non-investment projects, mainly demonstration and technical assistance projects. These were launched from 1994 onwards, with a marked increase in the number of projects approved in 1998. Many demonstration projects were followed by investment projects, which then took more and more the form of multi-year agreements leading to advanced phase-out of MB (earlier than the established deadline of 2015 for Article 5 countries).

16. About 90 per cent of the baseline amount for the African continent has been phased out: 2010 consumption was reported at 446 metric tonnes (268 ODP tonnes), and the baseline – calculated as the average consumption for the period 1995-1998 – at 4,471 metric tonnes (2,683 ODP tonnes). However, various African countries have expressed concern that the alternatives to MB offered and adopted through investment projects are not sustainable in the long term, and that there is a risk of returning to MB use. An urgent need to find strategies to ensure that the significant phase-out efforts will not be lost has been expressed. In this respect, establishing whether MB phase-out itself is impacting the livelihood of horticulture production in Africa or whether other factors are involved and a more holistic approach to agricultural uses is needed becomes essential.

17. The reduction schedule for Article 5 countries encompasses a freeze of MB consumption on the average of 1995-1998 levels from 2002 onwards, followed by a 20 per cent reduction as of 2005, until total phase-out by 2015.

18. MB projects are complex and unique in the sense that their success depends on many factors and involves many kinds of key stakeholders. Compared to the industrial sector, the sustainability of the alternatives adopted is less guaranteed by changing the equipment or technology previously used, since it depends on the technical and commercial viability of such alternatives and the enforcement of production, import and use restrictions. Farmers could always, even for one season, go back to using MB if this would look more advantageous to them for any reason[2]. Often the number of users is very large and diversified and decision making is decentralized which implies the need for both research and extension services to be fully involved in the promotion and correct implementation of MB alternatives. Extension services (not always present in official form in developing countries) are needed to provide technical assistance, develop training and awareness programmes, collaborate with research on technology generation and demonstration and take responsibility for its dissemination and adoption. Farmers tend to be reluctant to change established practices if economic feasibility (yield and quality that are at least as good as with MB) and risk-free application of new methods have not been clearly demonstrated for their particular situation. They are also exposed to lobbying efforts of some MB producers, importers or large- scale users who may still question the reliability of scientific studies on the subject and oppose the reduction schedules of the Montreal Protocol[3].

[2] http://www.multilateralfund.org/sites/46/Document%20Library2/1/4607.pdf
[3] http://www.multilateralfund.org/sites/43/Document%20Library2/1/4308.pdf

III. Objectives of the desk study

19. The desk study undertaken considered in general terms: a historical overview of MB phase-out in Africa and the progress made to date; the main MB consuming sectors in the region – tobacco seedlings, cut flowers, horticulture (particularly tomatoes, but also melons, strawberries, bananas and a variety of vegetables) and postharvest treatment of grains; the types of users (i.e. both large and small farmers, high and low tech producers); the main kinds of alternatives adopted; and factors influencing the sustainability of such alternatives (economic, political, regulatory, technical).

20. The main objective of this desk study is to identify the key issues affecting sustainability of the phase-out (already achieved and final) and determine questions needing follow-up for the full evaluation. It is possible that sustainability of use goes beyond MB phase-out and other factors are involved. An effort was made to characterize, to the best extent possible, constraints and hurdles to the adoption of alternatives identified as the most suitable for the particular circumstances of the sectors and users involved. Key areas of evaluation that emerged in the course of the desk study were also considered. The present document was sent to the implementing agencies for comment and their suggestions incorporated.

21. The Multilateral Fund has conducted several evaluation studies on the performance and impact of MB projects (2004, 2005) in Article 5 countries and later (2007) in LVC countries, with the aim of identifying specific factors influencing the success phase-out and estimating the likely factors to impact sustainability of the reductions achieved in the long term. The main findings from these studies are summarized in section VII.

22. A statistical overview of investment and non-investment projects undertaken in Africa, both completed and ongoing can be found in Annex II.

III.1. Methodology and data sources

23. A consultant was hired for the preparation of the desk study; the work involved examination of documents and reports related to all projects undertaken in Africa. These included progress reports, project completion reports (PCRs), and statistical analyzes and overviews. Previous evaluations and case studies on MB as conducted by the Multilateral Fund were also considered, particularly their conclusions and recommendations. All projects implemented in the region were analysed from a general perspective of their results and findings, however investment projects were then considered in more detail, since they carry a phase-out commitment, which other projects normally do not.

24. The analysis on MB consumption trends in Africa was based on statistics officially reported by the Parties in response to Article 7 of the Montreal Protocol and posted by the Ozone Secretariat at its Data Access Centre, which can be found at http://ozone.unep.org/new_site/en/ozone_data_tools_access.php.

25. Interviews were also conducted with implementing agencies, CAP officers, ozone officers of selected countries and other persons involved in the phase-out process of MB in Africa. Comments, observations and suggestions received have been included in this report.

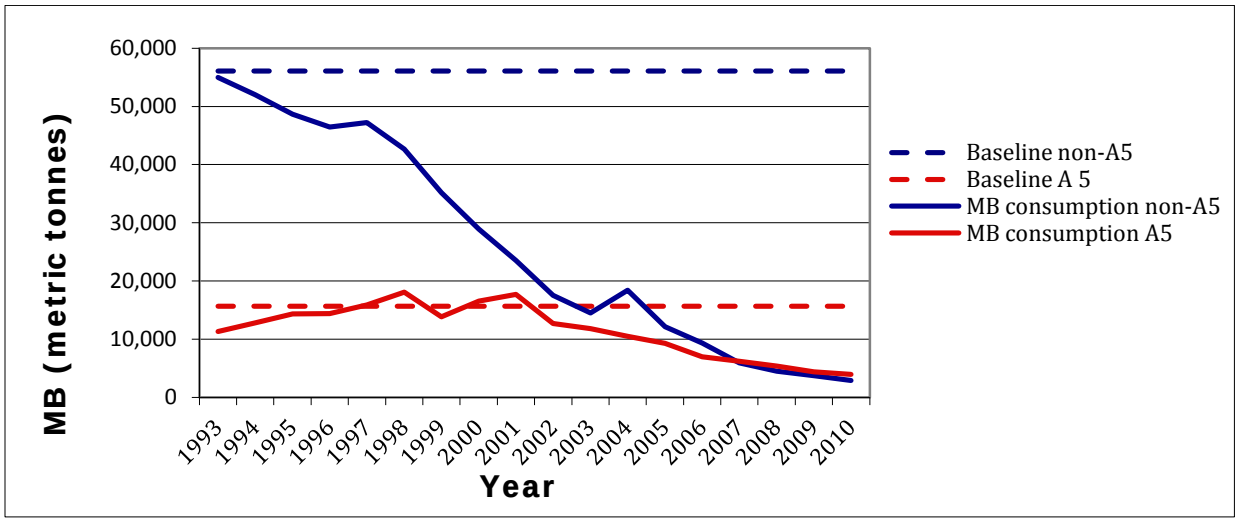
26. It is suggested that the desk study be followed by a more detailed evaluation report based on field visits and case studies in a sample of representative countries, and that this is scheduled to be submitted to the 68th meeting of the Executive Committee in November 2012.

IV. MB consumption trends and compliance with Montreal Protocol in Africa

IV.1. Global consumption of MB for controlled uses

27. Global consumption of MB for controlled uses was estimated to be more than 64,460 metric tonnes in 1991 and remained above 60,000 metric tonnes until 1998. On the basis of Ozone Secretariat data available in February 2012, global consumption had fallen to about 30,350 metric tonnes in 2002 and 6,937 metric tonnes in 2010. Article 5 countries have reduced MB consumption to about 25 per cent of their aggregate baseline level, following a steady increase that occurred until 1998. MB consumption was 12,830 metric tonnes in 2002 and in 2010 amounted to 3,998 metric tonnes. Figure 1 illustrates these trends, separately for Article 5 and non-Article 5 countries. MB consumption for controlled uses in Article 5 countries exceeded that of non-Article 5 countries for the first time in 2008. The reduction schedule for non-Article 5 countries mandated complete phase-out by 2005, except for critical use exemptions (CUE).

Figure 1 – Baselines and trends in reported MB consumption in non-Article 5 and Article 5 regions, 1991-2010 (metric tonnes)



Source: Ozone Secretariat Data Access Centre, February 2012

IV.2. Compliance with the Montreal Protocol reduction schedule in Africa

28. Eight African countries were not able to comply with the freeze in consumption that entered into force in 2002: Botswana, Cameroon, Côte d'Ivoire, Egypt, Lesotho, Mozambique, Tunisia and Uganda. However, only three – Libya, Tunisia and Uganda failed to comply with the 20 per cent reduction step in 2005 but have since come into full compliance with this requirement. The reasons for non-compliance in these three were clear, i.e. the political situation in Libya making project implementation and adoption of alternatives very difficult; lack of alternatives for high moisture dates, one of the important MB consuming sectors in Tunisia (this use was later exempted from controls by the Parties); and very fast expansion of the cut flower sector in Uganda using MB.

29. These three countries are now in full compliance (Libya has not reported consumption for 2010 but reported consumption for 2009 that was about one third of the baseline), as are the remaining 50 African countries. The present situation is the result of the activities implemented by numerous approved projects plus substitution efforts without funding from the Multilateral Fund. Table 1 below illustrates these figures.

Table 1 – Overview of compliance with MB reductions in Africa under the Montreal Protocol

	Countries that have ratified the Copenhagen Amendment	Countries that have not ratified the Copenhagen Amendment	Total
Countries presently in compliance with the Montreal Protocol	51	2*	52
Countries not in compliance with 2002 freeze	8	-	8
Countries not in compliance with 2005 20 per cent reduction	3	-	3
Non-users: countries that have not consumed MB since 1991	23	1	
Countries reporting zero consumption in 2010	43	1	43
Countries not yet reporting 2010 consumption	2**	-	

Source: Ozone Secretariat Data Access Centre, February 2012

* Guinea, South Sudan
** Libya, Mozambique

IV.3. MB consumption in Africa

IV.3.1. Consumption in Article 5 countries by region

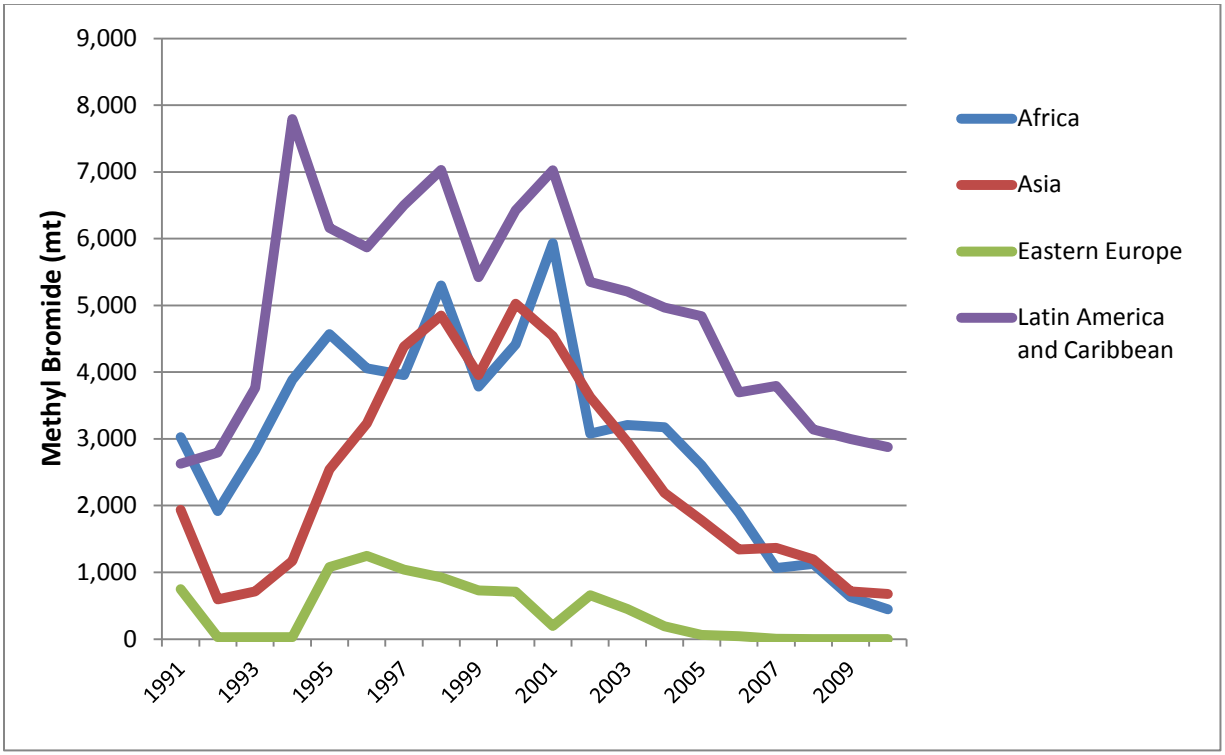
30. The Article 5 baseline was 15,867 metric tonnes (average of 1995-98), rising to a peak consumption of more than 18,125 metric tonnes in 1998. Total Article 5 consumption was reduced to 44 per cent of baseline in 2006 (6,935 metric tonnes) and 25 per cent of baseline in 2009 (3,999 metric tonnes).

31. All Article 5 regions have made great strides in achieving MB phase-out, but at different rates and with specific associated issues, for example agricultural developments that impose stringent yield and quality requirements (i.e. intensive agriculture for export) and makes control of soilborne diseases and pests more important or expansion of grain production, requiring larger quantities to be stored (and which need to be fumigated for pest control). Commercial issues are also a factor (price of MB in comparison to that of alternatives, registration and availability of alternatives, willingness or reticence to change on the part of farmers and other uses, and others).

32. Consumption rates of MB in Article 5 countries (by region) are presented in Figure 2. At present, African consumption represents about 11 per cent of total aggregate consumption for Article 5 countries, above Asia and Latin America and down from 20 per cent in 2006.

33. A peak in consumption is evident during the baseline years, which is present also in other regions. An even more significant peak is registered in 2001-2002, presumably due to expansion of certain use sectors in Africa, for example cut flowers for export and tobacco cropping areas (requiring larger seedling production), tomato production also for export and others.

Figure 2 – MB consumption for controlled uses in Article 5 regions 1991-2010



Source: Ozone Secretariat Data Access Centre, February 2012

IV.3.2. Low volume, medium and large users

34. MB consumption has traditionally been concentrated in about ten countries in Africa. For 2010 (the last year for which official consumption information is available from the Ozone Secretariat), the following breakdown was recorded:

Table 2 – Large, medium and small MB consumers in Africa, at 2010

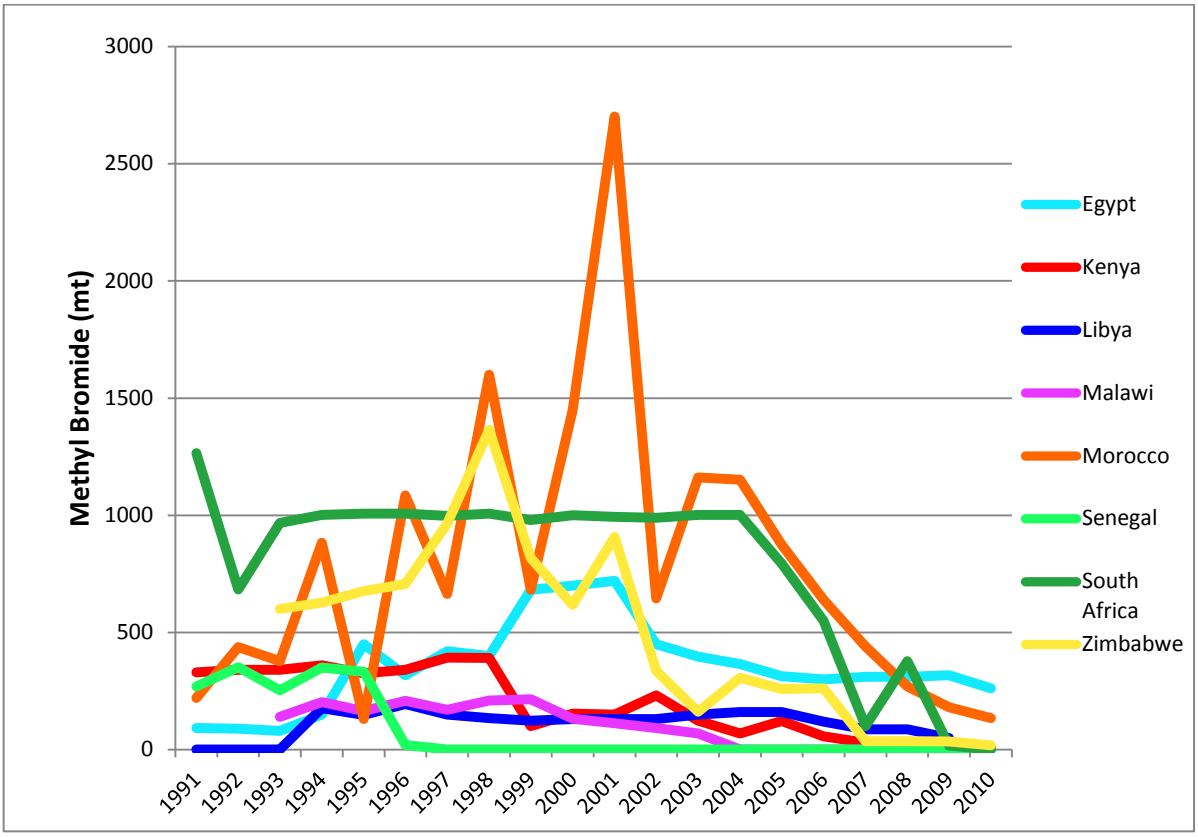
No. of countries	2010	According to baseline
Countries never using MB	23	23
Countries with zero consumption in 2010	20	
LVC < 5 metric tonnes	3	15
Consumption 5 - < 50 metric tonnes	3	7
Consumption 50 - < 100 metric tonnes	-	1
Consumption 100 - < 500 metric tonnes	2	4
Consumption > 500 metric tonnes	0	3
TOTAL	**51***	**53**

* Two countries, Libya and Mozambique, have not reported consumption for 2010.

35. Consumption trends in the eight largest MB consuming countries in Africa are graphically illustrated in Figure 3. Great variations are particularly noticeable in Morocco in 2001-2002, most possibly as a result of expansion of the tomato sector, which has made this country the largest exporter of this vegetable to Europe. Variations are also apparent in Kenya and Zimbabwe in the late nineties, when cut flower production for export was developed (floriculture exports from Zimbabwe were greatly

reduced around 2003 mainly due to political reasons). South Africa (a non-Article 5 country for the purposes of MB and other ODS, except for HCFCs), a large consumer for several years, reported zero consumption in 2010. These eight large consumers would presumably be the ones at higher risk of reverting to MB use, and thus the study focuses more closely on them.

Figure 3 – Consumption trends in African countries with baselines for MB consumption above 90 metric tonnes, 1991-2010



Source: Ozone Secretariat Data Access Centre, January 2012

36. Phase-out or investment projects funded by the Multilateral Fund have been implemented in all large consuming countries in Africa and many are now finished (of 34 investment projects implemented throughout Africa, 25 have been completed and 9 are ongoing).

37. Table 3 shows consumption and agreements for phase-out in African countries; Kenya, Libya, Malawi, Morocco and Zimbabwe have multi-year agreements. Investment projects have been or are being implemented in all of these countries except South Africa, which is not eligible for funding under the Multilateral Fund in respect of this substance.

Table 3 – Consumption of MB in Africa (ODP tonnes)

Country	MB baseline	Reported consumption			2010 maximum allowable consumption for countries with MYAs*	Total MB consumption approved for funding countries with MYAs	Remaining unfunded consumption for countries with MYAs
		2008 (A7 data)	2009 (A7 data)	2010 (A7 data)			
Cameroon	18.1	3.3	0	0	N/A	N/A	N/A
Côte d'Ivoire	8.1	0	0	0	N/A	N/A	N/A
Egypt	238.1	**186.0	**190.2	**157.2	N/A	N/A	N/A
Kenya	217.5	10.2	3.6	6.6	14.0	103.6	0.0
Libya	94.1	51.7	30	Not rep.	30.0	96.0	0.0
Malawi	112.8	0	0	0	N/A	129.0	0.0
Morocco	697.2	**161.8	**108.4	**80.9	56.2	496.1	0.0
Senegal	53.2	0	0	0	N/A	N/A	N/A
South Africa	602.7	225.9	10.3	0	N/A	N/A	N/A
Uganda	6.3	0	0	0	N/A	N/A	N/A
Zambia	29.4	4.2	3.2	2	N/A	N/A	N/A
Zimbabwe	557.0	21.6	21	10.8	N/A	170.0	0.0

* As per agreed conditions between government concerned and the Executive Committee.
** Countries with MYAs have agreements approved for complete phase-out of MB.

V. Executive Committee strategy and guidelines – Africa

V.1. Actions undertaken with respect to MB

38. Subsequent to the introduction of controls on MB and considering the level of funding available for MB demonstration and investment projects, the Executive Committee convened a meeting of experts for developing a strategy and guidelines for projects in this sector (23rd meeting, November 1997). In March 1998, at the 24th meeting, the Executive Committee adopted a strategy to assist in allocating resources for MB projects (for a period of 18 months).

39. The strategy and guidelines were subsequently reviewed and revised by the Executive Committee in December 2000 at its 32nd meeting (decision 32/80). They cover all aspects of MB phase-out: determination of MB consumption data, definition of major use categories and priority areas for Multilateral Fund projects, instructions for project preparation, categories of incremental cost, and eligibility criteria.

V.2. Main conclusions from previous evaluations on MB conducted by the Multilateral Fund (in the context of Africa)

40. In 2004 and 2005, the Multilateral Fund undertook evaluation and monitoring studies to determine the impact of MB projects and identify possible problems with their implementation or hurdles to adoption of alternatives. The studies also looked at cases of non-compliance in particular countries or where a risk of non-compliance existed.

41. Evaluations conducted so far on MB are the following: a detailed desk study of demonstration and investment projects based on project reports and other sources of information was undertaken in 2004 and presented to the 43rd meeting of the Executive Committee in June 2004 (UNEP/OzL.Pro/ExCom/43/8[4]). This was followed by 16 case studies of four sectors (flowers, vegetables and fruits, tobacco, and post-harvest) for which 13 countries were visited in 2004 and 2005. The final

[4] http://www.multilateralfund.org/sites/43/Document%20Library2/1/4308.pdf

report was presented to the 46th meeting of the Executive Committee in June 2005 (UNEP/OzL.Pro/ExCom/46/7[5]).

42. MB issues and projects were also analyzed in an evaluation of cases of non-compliance or potential non-compliance aimed at identifying common causes of non-compliance. The report was presented to the 50th meeting of the Executive Committee in November 2006 (UNEP/OzL.Pro/ExCom/50/9[6]), which had been preceded by a desk study presented to the 46th meeting of the Executive Committee (UNEP/OzL.Pro/ExCom/46/8[7]).

43. Finally an extended desk study on methyl bromide projects for low-volume-consuming countries was conducted in 2007 (UNEP/OzL.Pro/ExCom/53/8[8]), which considered specific issues associated to countries reporting consumption below 5 ODP tonnes.

44. In general terms, these studies determined that technology choice for the projects was generally appropriate and had been supported with demonstration trials, following discussion with key stakeholders and information on commercial adoption occurring in the same country or in similar regions and sectors. However, instances were identified where advanced technologies had been implemented or equipment delivered without a solid examination of their technical or economic sustainability. Examples of this are steam for strawberries or tomatoes grown by small farmers or cooperatives, as well as CO_2 and high-pressure chambers for post-harvest treatments, and electronic meters that cannot be easily calibrated.

45. Evident reluctance of MB users to change to alternatives was identified in all sectors studied in the course of these evaluations. The fact that MB cannot usually be replaced by one single and equally effective alternative implies that growers and other stakeholders have to change their approach to production and process management. This relates mostly to IPM but also time management, as alternatives often require longer exposure times than MB[9].

46. In the course of the evaluations, the Multilateral Fund concluded that the most successful projects had conducted careful evaluation of the particularities of each country, proposing alternatives, which varied with climate and soil differences, but which, above all, were highly accepted by users. The technical analysis and identification of suitable alternatives was largely achieved through the demonstration projects, which covered all sectors and regions, and this applied also to Africa. With very few exceptions (for example fresh dates), sufficient proof of the technical feasibility of alternatives has been achieved and documented worldwide (see the Methyl Bromide Technical Options Committee (MBTOC) Assessment Reports of 2002, 2006, 2010).

47. Investment projects in general followed demonstration projects, which provided the basis for trialling alternatives and selecting those best suited for commercial adoption. Consideration of experience acquired with similar sectors in similar regions or country situations and involving key stakeholders proved to be critical in the acceptance of alternatives and ensuing commercial adoption. It is thus important to consider issues beyond the technical and economic feasibility of alternatives, when assessing their sustainability (for example, market drivers, market windows, consumer issues).

48. It was found however that many projects had not sufficiently considered the economic feasibility of the proposed alternatives, and that factors such as local equipment maintenance and supply were not always sufficiently assured. When analysing more recent project reports however, it is evident that these issues are now being accounted for, and economic feasibility, as it impacts commercial adoption of selected alternatives, is now considered. Further, several projects are also addressing registration of

[5] http://www.multilateralfund.org/sites/46/Document%20Library2/1/4607.pdf
[6] http://www.multilateralfund.org/sites/50/Document%20Library2/1/5009.pdf
[7] http://www.multilateralfund.org/sites/46/Document%20Library2/1/4608.pdf
[8] http://www.multilateralfund.org/sites/53rd/Document%20Library2/1/5367.pdf
[9] http://www.multilateralfund.org/sites/43/Document%20Library2/1/4308.pdf

chemical alternatives, with the implementing agency contributing to the process when possible. This ensures that alternatives showing promising results are commercially available to growers and other consumers but cannot be guaranteed, as there are additional factors such as commercial incentives and market forces that go beyond what a project can achieve.

49. With respect to LVC countries, it was found that in some cases such countries had undertaken demonstration and/or investment projects, but more often had been helped through technical assistance and awareness raising activities aimed at preventing increases in consumption. This may occur in particular when certain agricultural sectors suddenly expand (i.e. floriculture, intensive horticulture). The potential for illegal trade with MB-LVC countries where regulation and controls for MB have generally not been put in place was also identified. However, a cost analysis, to determine whether this would be an economically efficient option would help clarify if this was indeed an attractive path to follow.

50. Of particular interest to the present analysis was the regional TAS project for LVC countries in Africa. The project groups countries according to levels of MB consumption, but turned out to be difficult to implement, due to the diversity of the countries involved. Actions needed in one region may well involve both low and high consumers. This TAS project focused on (very) LVC countries and those without consumption (the majority), and was primarily aimed at assisting compliance with the 20 per cent reduction in MB consumption by 2005, which it largely achieved. It also involved comprehensive policy work in all participating countries that was not always successful. Lessons learned from this project are discussed in section 6.4 of this report.

VI. Results of the desk review

VI.1. Availability and quality of information

51. Project reports, and in particular completion reports are of much better quality than in the past, and the number of reports that are pending at the time of this evaluation is low. The format introduced by the Multilateral Fund Secretariat for the appraisal of reports provides useful and consistent information, allowing for more thorough evaluation, and enabling consideration of comparable parameters. Information on consumption of MB as submitted to the Ozone Secretariat under Article 7, and which is available through the Ozone secretariat website, is much more complete than in the past and allows for analysis of general consumption trends. Project documents provide good insight of the main MB consuming sectors and progress made in implementing alternatives.

52. Some projects however and in particular regional ones, which bring together heterogeneous sectors or involve LVC countries, still suffer from poor quality of information that may stem from not having systems in place to specifically trace imports and consumption of MB. Insufficient involvement of key stakeholders may also affect the quality and quantity of information available.

VI.2. Analysis of projects implemented in Africa and phase-out achieved

53. Sixty-nine projects have been approved for implementation in Africa since 1997. Of these, 23 have been for TAS or TRA, 13 were demonstration projects and 33 investment projects. Annex II at the end of this document contains statistics related to these projects, the alternatives selected and the phase-out achieved through them.

54. All large consumers (with the exception of South Africa), a very high proportion of medium and LVC countries and many non-consumers have been assisted by the Multilateral Fund to comply with Montreal Protocol requirements relating MB. South Africa was deemed eligible for a project to be implemented under coordination of the Global Environment Fund (GEF) but did not submit a proposal.

Its latest reported consumption to the Ozone Secretariat (2010) is zero ODP tonnes, however it is not clear whether total phase-out was achieved or it will be reporting consumption again in the near future.

55. Awareness-raising and training activities have been systematically carried out as a first step in the promotion of all projects of all types. They are continued throughout the projects' lifetime and play a major role in the commercial adoption of the alternatives[10]. By definition, the involvement of stakeholders, particularly growers, appears to be easier to organize when the number of growers using MB is relatively small than when large numbers of users are involved (for example flower growers in Kenya versus a large number of tobacco growers in Zimbabwe). Public and private extension support is essential in all projects and particularly those where large numbers of farmers are involved; trade associations or similar institutions generally play a key role in this. It is also essential that the project management and the leading ministries are sufficiently involved in the project and help approach the growers. Increasingly over time, steering committees seem to have been established in projects with positive results.

VI.2.1. Technical assistance projects

56. Africa is the Article 5 region with the highest number of TAS and TRA projects. Fifteen individual and eight regional projects have been conducted since 1995, with duration ranging between one and four years. Some involved workshops or surveys, while others comprised more widespread training and dissemination activities, including educational materials. The overall aim of these projects is to enhance awareness about the MB phase-out, provide information on alternatives, identify and involve key consuming sectors and stakeholders, and prevent potential expansion of MB consumption. TRA projects usually include a strong training component to ensure appropriate dissemination of technologies.

57. TAS and TRA projects have also played a key role in improving data collection on MB consumption, integrating the NOUs to phase-out activities and developing or strengthening policy packages aimed at sustaining the phase-out achieved. Often, and particularly in more recent instances, these projects were approved on the understanding that the country (or countries in the case of regional projects) where the project is implemented will not seek additional funding from the Multilateral Fund for the phase-out of controlled uses of MB.

58. Although normally not aimed at directly replacing MB, in four instances, TAS projects have led to phase-out of MB such as in Algeria, Ghana, Sierra Leone and the regional LVC project. Table 1 in Annex I presents the TAS and TRA projects implemented in Africa, together with information on their general achievements and goals.

VI.2.2. Demonstration projects

59. Demonstration projects were instrumental in raising awareness about the MB phase-out, establishing the key consuming sectors and identifying the most suited (or unsuited) alternatives to this fumigant. Their general intent was to trial potential alternatives, selecting those appearing as most appropriate, for later implementation during investment projects. This goal was achieved in various cases (for example Malawi, Zimbabwe). They were not aimed at phasing-out a particular amount of MB.

60. Demonstration projects however also served to identify (and help solve) various problems; many suffered significant delays as a result of inappropriate involvement of key stakeholders, lack of participation from NOUs, alternative technologies resulting inappropriate for the circumstances of the consuming sector, reluctance from the part of consumers in accepting the MB phase-out and others. Many did not sufficiently consider the economic feasibility of the alternatives selected, and a smooth and

[10] http://www.multilateralfund.org/sites/43/Document%20Library2/1/4308.pdf

fruitful transition between demonstration and investment projects was not always apparent (for example in Kenya where it was reported that findings from the demonstration project were not considered for the investment stage)[11]. These issues served as important lessons for investment projects, providing an opportunity for adjustment and change when necessary.

61. Table 2 in Annex I contains overviews of demonstration conducted in Africa, with some general comments on their results, achievements and problems identified, when relevant. All demonstration projects are now finished except for the regional project on high moisture dates (Algeria and Tunisia). Except for Malawi, which achieved phase-out of 32 metric tonnes at the demonstration stage, these projects were not aimed at phasing out any amount of MB. Malawi then undertook three follow-up investment tranches that lead to complete phase-out of MB use in the tobacco sector in 2004 – well ahead of the 2015 baseline.

VI.2.3. Investment projects

62. Investment projects were generally implemented once successful alternatives identified during the demonstration stage were selected for commercial adoption. They carry an agreement from the country where implemented, to phase out MB consumption for controlled uses, and to support sustainability of the phase-out achieved with a policy package aimed at banning such uses in future.

63. Of the 1,832.7 ODP tonnes (3054.5 metric tonnes) approved for phase-out in Africa with the aid of projects, 1,471.1 ODP tonnes (2,451.8 metric tonnes) or about 80 per cent had been phased-out at the end of 2010. Of the 69 projects approved, 57 have been completed or finished and only 12 are still ongoing (this includes the regional TAS project for LVC countries and the regional demonstration project in Algeria and Tunisia to identify alternatives for high moisture dates).

64. Table 3 in Annex I provides a general overview of investment projects implemented in Africa. These were considered to be the most important for the present analysis and posterior follow-up, given that they carry a phase-out commitment and address sustainability issues of the alternatives selected.

VI.3. Main use sectors involved and alternatives selected

65. In spite of the diversity of countries and high number of projects implemented in Africa, these tend to concentrate around a relatively low number of agricultural use sectors:

(a) Horticulture (including bananas and strawberries) – at present consumption remains important mainly on tomatoes as well as some varieties of vegetables, for example green beans in Morocco; consumption in strawberries seems important in Egypt in particular for nurseries (strawberry runners). Consumption in other horticulture sectors such as bananas, melons and peppers, is largely phased out;

(b) Tobacco seedlings – already phased out in most countries previously reporting this use (for example Malawi), and well advanced in others (Zambia, Zimbabwe). In this sector where a very successful alternative has been implemented worldwide (floating trays) and has proved to be technically feasible, often giving better yields and quality than MB. After the investment, training and production strategy necessary to implement this alternative it is unlikely that a grower returns to MB. However problems with sustainability have been reported in Africa, mainly due to difficulties in sourcing materials such as seed trays and substrates, at competitive prices;

[11] http://www.multilateralfund.org/sites/43/Document%20Library2/1/4308.pdf

(c) Cut flowers – already phased out in larger consumers such as Kenya, Uganda and Zimbabwe. Some consumption still remains in Egypt and Zambia;

(d) Postharvest uses, mainly stored grain (for example, corn). High moisture dates, which also belong in this group, pose specific difficulties and in fact have been exempted for the time being from MB phase-out through decision XV/12 of the Fifteenth Meeting of the Parties to the Montreal Protocol, which recognizes the risk of potential non-compliance for those Article 5 countries that rely on the use of MB to stabilize and disinfest high moisture dates at time of harvest.

66. Tables 2 and 3 in Annex I provide general information on the main alternatives trialled during demonstration projects conducted in Africa, and on investment projects – both finished and ongoing – leading to actual replacement to MB. Comments on the performance of alternatives, actual or potential problems with the sustainability of alternatives implemented and others are based project reports, electronic/telephone interviews with implementing agencies, CAP officials, selected NOUs and others. It is of high importance however to recognize particular circumstances of each sector and country involved. Conclusive statements on whether or not an alternative system or technology is sustainable can only be made if a variety of factors are considered, including specific pests and/or diseases to be controlled, cost analyses, availability/feasibility of technologies proposed, market forces and others.

67. Investment projects often followed a demonstration project in the same use sector (for example, cut flowers in Kenya or horticulture in Egypt), which served to provide a sound basis for the alternatives selected for adoption in the investment stage. In some cases, however, investment projects were implemented without an initial demonstration stage (for example, the cut flower sectors in Uganda and Zimbabwe, see Table 3 in Annex 1). Reconsideration or adjustment of alternatives has also occurred and this has usually had a positive impact on project results.

68. Even when the demonstration stage was successful, investment projects may need to address new pest problems, consider recent research developments and find improved technologies such as grafting, improved substrate production technologies, new chemicals available and others.

VI.4. Factors influencing the long-term sustainability of MB phase-out

69. The main factors impacting sustainability of MB phase-out have been previously identified through Multilateral Fund evaluation studies as follows[12]:

(a) Technical – whether alternatives selected and implemented provide the required level of control. In general, if alternatives are comparable or not significantly different in their results to those obtained with MB, technical feasibility is ascertained. However, even more important is the fact that a replacement technology is suited to particular circumstances of the use sector and stakeholders involved – not necessarily in direct comparison with MB;

(b) Economic – whether alternatives are affordable, at least to the same degree as MB. Again, the most important issue is that the grower or previous user can afford the costs of the proposed technology while maintaining an acceptable profit, not necessarily how such costs compare to MB. An alternative may be more expensive than MB but lead to higher yields and quality, offsetting the extra cost and improving commercial acceptance and market penetration of a given product. Other factors affecting economic sustainability exist, for example whether services and supplies related to alternatives are locally

[12] http://www.multilateralfund.org/sites/43/Document%20Library2/1/4308.pdf

available or need to be imported, whether a certain production technology allows for competitive access to a given market, and others;

(c) Regulatory – whether alternatives identified as suitable are locally registered and readily available to users, and/or whether there are any restrictions to the use of chemical alternatives (for example, buffer zones);

(d) Political – whether MB phase-out is supported with legal dispositions, for example, restricting or banning imports of MB for controlled uses once the phase-out has been completed, whether imports destined for QPS uses can be easily tracked and followed up (avoiding imports for QPS ending up illegally used for controlled uses).

70. Other relevant issues may include types of users (small farmers selling at the local market, for example, or exporters competing at the international level), the degree of technical development, and access to supplies, services (maintenance) and technology updates.

VII. Main findings of the desk study

VII.1. Commercial adoption of alternatives and present or potential constraints – technical and economic feasibility

71. In general, the project reports and documents refer to the appropriateness/sustainability of the alternatives selected, and this issue is considered with the relevant stakeholders. Actual or potential factors impacting the commercial adoption of alternatives include availability of services and supplies to guarantee appropriate maintenance of the technologies selected, sufficient training and familiarity with new technologies and possibilities of continued training and access to new developments. Efforts have been made in several projects to identify local supply sources to ensure economic feasibility of alternatives – for example substrates needed for tobacco seedling production in Malawi and Zimbabwe – or to adapt technologies to particular circumstances – for example tobacco trays with fewer cells which are better suited to environmental conditions in Zimbabwe.

72. Two meetings which are relevant to this desk study were organized in 2011: The "Dialogue on Key Future Challenges Facing MB Phase-out in Africa" (organized by UNIDO in Vienna, Austria, 5-6 July 2011) and the "Regional Consultative Meeting for MB Experts" (organized by UNEP in Nairobi, April 2011) helped identify specific constraints with the sustainability of the reductions achieved:

(a) Sufficient, well-informed and active involvement and commitment of the NOUs is crucial for the successful replacement of MB. Often it was noted that the NOUs are hosted by the Ministries of Environment with limited responsibilities and understanding of issues related to agriculture, post-harvest and quarantine measures;

(b) Stronger coordination between NOUs, national MB experts and institutions responsible for agricultural development was deemed necessary.

73. The main problems identified as impacting the technical sustainability of alternatives implemented included efficacy of chemical alternatives and possible development of (pest) resistance, which is often associated to inadequate use of these products, costs, commercial availability, difficulties with registration and international bans on certain chemicals, which can impact exports of products produced using such substances. Problems with the availability of MB were also identified, in relation to illegal trade and increasing demand of MB for QPS (in particular, whether MB imported for QPS purposes could be diverted into controlled uses). With respect to awareness raising and training, attendees

present at the meeting referred to the emergence of new farmers since the completion of MB projects and insufficient familiarity with new chemicals and new technologies.

74. The need to comply with international environmental standards such as EUREP-GAP imposed by consumers and foreign markets is a strong driver supporting the MB phase-out. These standards often ban MB use and impact specialized sectors such as cut flowers (e.g. Kenya, Uganda, where the production is exported in a high proportion to the European Union (EU), tomato (e.g. from Morocco, the largest African exporter of tomatoes to the EU) and tobacco (e.g. in Kenya, Malawi and Zambia where tobacco farmers do not market their product directly but sell to a consortium or tobacco board requiring specific production standards).

VII.2. Institutional issues

75. Previous evaluations have clearly identified that when local institutions are directly involved with the phase-out process, continued results are better assured, as key stakeholders get first hand participation in the selection of alternatives, pertinent commitments or agreements and, as a consequence, in the commercial adoption of alternatives. Examples of such institutions or entities include the Tobacco Research Board in Zimbabwe, the Agricultural Research and Extension Trust (ARET) in Malawi, the Uganda Flower Association and the Kenya Flower Association. Involvement of research institutes that can provide important services such as pest and disease diagnosis, recommendations for control and training are also very useful. Sufficient involvement of pertinent authorities is also necessary.

76. Recommendations arising from the two meetings mentioned in the previous section include the development of national and/or regional technology transfer centres for training growers and monitoring the performance of alternatives in critical sectors and which involve key stakeholders (for example, these centres could be managed by growers associations); providing opportunity for sharing ideas and discussing problems through networking/regional workshops; conducting evaluations and follow-up of projects that are now completed with the aim of documenting the current performance and efficacy of adopted alternatives and identify possible risks of reverting back to MB especially when this fumigant is still in use in other sectors; considering possibilities of upgrading or refurbishing existing infrastructures (e.g. nurseries, phosphine application facilities) to make MB alternatives available and viable; and setting up a tracking system to avoid diversion of QPS MB to non-QPS uses by strengthening regulatory agencies to establish monitoring/surveillance systems on use of MB.

VII.3. Regulatory issues concerning MB and alternatives

77. All projects funded by the Multilateral Fund include an agreement between the relevant government and the Executive Committee to maintain the phase-out achieved and, in most cases, to not request any further funding for MB phase-out once this is completed. Phase-out schedules are part of the agreement and are subject to regular follow-up; if not achieved, this needs to be justified and renegotiated if necessary.

78. Further, many projects include a commitment from the country where the project is being implemented to issue legislation banning MB. Examples include Kenya where uses of MB for soil treatment are now banned (only postharvest uses are permitted and only a maximum quantity allowed); Malawi, where imports of MB have been banned since 2004 (ten years before the 2015 deadline for Article 5 Parties); Morocco where MB use is banned for the strawberry, cut flower and banana sector.

79. These measures support the MB phase-out achieved, however need to be part of a wider approach including elements previously described. In conjunction, registration and commercial availability of successful alternatives need to be ensured. Although initializing registration lies outside the scope of action of governments and is a commercial matter usually in the hands of private companies, they could facilitate and speed the legal registration procedure once such companies make an application.

Implementing agencies (UNIDO in particular) have in some instances worked together with companies and local authorities to facilitate registration of chemical alternatives.

VII.4. Regional versus individual efforts

80. Regional strategies seem appropriate to support phase-out efforts, particularly to avoid the perception that a country where use of MB is still allowed has an advantage over another that has already phased out. Regional efforts to raise awareness, and encourage information and experience sharing can support the successful replacement of MB. However these should be carefully considered in their scope and objective as described below in reference to the regional project involving 20 African countries with very low or no consumption. The project was intended to help countries involved to meet the 20 per cent reduction step in 2005, and this was certainly achieved. It sought to identify viable alternatives for countries with consumption but did not include technical demonstrations.

81. Major hurdles faced during the implementation of the project included difficulties in collecting accurate information especially regarding MB consumption, but this was found not inherent to the regional approach, and the accuracy of the data, and difficulties encountered with customs authorities to provide such data seems to remain an outstanding issue. Again, this was not inherent to the regional approach; it was found that participating countries were not fully convinced of the benefit of the regional outlook: on one hand they wanted the implementing agency to adopt a "blanket approach" but on the other hand they tried to negotiate specific conditions, which was understandable but often not possible. Difficulties with internal communication among authorities and stakeholders were also identified.

82. The regional approach nevertheless helped to centralize the information and facilitated information exchange between countries. Key stakeholders were identified in the participating countries, and although their involvement in the project varied greatly from one country to another, it was at minimum possible to establish MB committees and prepare national strategies to prevent the introduction of MB in non-consuming or avoid increase in consuming countries. This provided improved understanding of the MB issue in general in the participating countries.

83. Initiatives investigating such regional trade agreements, harmonized legislation, training of customs officials, documenting academic and research efforts relating to MB alternatives, sharing experience and information are clearly useful. Countries involved in those actions would not necessarily all be MB-LVC countries.

VIII. Conclusions of the desk study and recommendations for further evaluation

VIII.1. General conclusions

84. The phase-out of controlled uses of MB in African countries is presently very significant. On the basis of the reports analyzed, the data available and the results recorded it is evident that key consumer sectors have been identified and addressed, alternatives of various kinds have been trialled under a variety of circumstances and for a variety of users, and ample assistance to promote alternatives, disseminate information and strengthen policy to support the phase-out has been provided.

85. Investment projects, which are recently completed or still ongoing, have addressed to a much larger extent than previously very relevant issues such as economic feasibility of alternatives and regulatory issues (e.g. registration of alternatives), as well as factors influencing market adoption of alternatives proposed (modern technologies, acceptance by key stakeholders, market windows and requirements, consumer issues). Information exchange has been strongly encouraged – for example through study tours conducted in both non-Article 5 and Article 5 countries to observe commercial implementation of successful alternatives to MB.

86. Nevertheless African countries in particular have expressed a clear preoccupation with respect to the sustainability of the selected alternatives after the projects come to an end. Factors such as the arrival of new users that were not sufficiently aware and trained on alternatives, the expansion of sectors typically using MB after the projects are finished or well advanced, increased quality requirements imposed by markets and competition, inconsistent performance of some alternatives and pressure from MB sellers have been quoted during the interviews conducted as putting the sustainability at risk. It is also clear that other factors – besides the MB phase-out – can influence the sustainability or livelihood of agricultural uses.

VIII.2. Suggested strategies

87. From the information collected it appears that further and more thorough involvement of NOUs in MB-related issues, as well as trade associations, research centres, and local or regional extension/academic institutions and experts is necessary. Steering committees may be strengthened and given a more technical approach and/or working groups may be formed, perhaps focusing on specific productive or consumption sectors (e.g. floriculture, grain, tobacco). Issues such as resistance to pesticides (which can often be avoided through good management practices) need to be addressed and resolved. Training strategies could be further emphasized, by establishing longer-term cooperation efforts with local organizations or institutions. The training center developed in Morocco for example has been often cited as one of the reasons for the high level of success of the projects conducted in that country. Sources of funding for such efforts would logically need to be addressed, as they may not fall within the scope and mandate of the Multilateral Fund.

88. In line with the suggestions above, a first step could be to organize a regional meeting with participation of representatives from key countries and sectors, perhaps during the course of one of the field visits suggested.

89. Consolidating case studies on alternatives to MB suited to particular sectors of importance within the region was suggested on several occasions. Technical workshops at the regional level, to share experiences in the identification, implementation and adoption of alternatives for particular sectors (i.e. flowers, horticulture, stored grain, tobacco) are still needed. Such activities could be implemented under the coordination of an implementing agency, or even through inter-agency cooperation or regional NOU network meetings.

VIII.3. Issues recommended for further evaluation

90. Some relevant issues are not completely clear from the information available for the desk study and further analysis is suggested through a field study. It is particularly important to clarify whether MB use is indeed banned in those countries where phase-out has been completed, as per the usual country agreements. This should indeed be the case, and should not allow for users to revert to MB use on a legal basis, which makes strengthening the sustainability of alternative technologies by 2015 even more important.

91. Risks associated to the adoption of new alternative technologies concern not only the direct replacement of MB. Particular market forces may have a direct influence on the adoption of the proposed technology; for example, whether sufficient demand is present to justify local manufacture of the supplies needed or whether an importer can bring them in at a price growers would be prepared to pay. These risks should be assessed and categorized according to their impact (high, medium, low), and an analysis made of whether or not actions can be taken in this respect under the Multilateral Fund.

92. Another issue that repeatedly emerges during contacts made for the desk study is that of illegal trade from countries still allowing export of MB into countries that have banned it, and also as a result from diverting MB imported for QPS uses to controlled applications. Further analysis of these situations

and determining possible ways in which they can be corrected appear appropriate. If illegal MB is indeed available, willingness (and capability) of growers to buy it and use it under such conditions should be assessed.

93. Difficulties sourcing supplies at the local level impacts the economic feasibility of some alternatives (for example, trays for tobacco seedling production into Malawi and Zambia need to be imported at high cost), and scarcity of appropriate maintenance services for certain technologies were also mentioned. An assessment of these problems, and their possible solutions, should be directly addressed with key stakeholders.

94. Facilitating robust strategies to preserve the phase-out achieved seems particularly important at the present moment, when – as stated above - the possibility to submit critical use nominations for the use of MB is coming close for Article 5 countries. Disadvantages of extending the phase-out beyond 2015 and embarking into the CUN process need to be explained; market headway made by those that are able to sustain the phase-out should be highlighted. Environment-friendly production practices are increasingly important especially in Europe, which is the main importing market for African produce and this must not be overlooked.

95. Given the concern expressed in relation to difficulties in registering chemical alternatives and also with the fact that other fumigants besides MB are being banned in some countries (for example, 1,3-D in the EU), further promotion efforts of non-chemical alternatives or at least reducing dependence on chemicals through the implementation of IPM programmes seems very important. This should not be difficult since IPM training has been consistently included from the demonstration project stage.

96. Finally, in view of the potential proximity of CUNs from Article 5 countries, providing appropriate information and guidance on them is important. CUNs are assessed on a yearly basis and are recommended upon fulfilment of strict guidelines as set out by decision IX/6 of the Ninth Meeting of the Parties to the Montreal Protocol and others. Among others, minimum dosage rates of MB must be met; formulations and application methods to reduce emissions must be used; research efforts on alternatives, and evaluation of technical and economic feasibility must be shown, if claimed to not give results comparable to MB. The perception that in order to continue use of MB all that is needed is submitting a CUN, should be clearly avoided.

VIII.4. Further suggested actions

97. After analyzing the general situation in the 53 countries comprising the African region, and considering both individual and regional projects, the Executive Committee may wish to consider approving a second stage of evaluation, which includes field visits to five or six key countries for more in-depth analyses of the issues governing sustainability of alternatives. A sample of representative countries, which include the more relevant aspects identified could be analyzed in more depth to get further understanding of the issues involved, and this would provide the basis for proposing a strategy to support sustainability.

98. Given that the main objective of the desk study is to identify strategies to support the long-term sustainability of the MB phase-out achieved, it seems logical to concentrate on larger consumers and on results obtained through investment projects. Drawing a representative sample of countries and sectors to obtain further information from and is proposed as follows:

(a) One country where the phasing out has proceeded successfully – Morocco where phase-out has been achieved in bananas, strawberries, cut flowers and more recently tomatoes;

(b) Two countries reporting difficulties – Egypt reports problems with registration of alternatives and others. Uses in these countries are both soils (flowers, vegetables and others) and post-harvest (grain storage); Kenya is reporting zero for soils uses but even the PCR warns that phase-out may not be sustainable;

(c) One country with zero consumption for several years but apparently finding it difficult to sustain the phase-out – Malawi is the best candidate and it involves an important sector (tobacco). Of upmost importance is establishing the nature of the reported difficulties, whether they are directly related to MB not being available (or another reason), and whether it would be feasible to have access to MB (which is now banned in the country);

(d) Cameroon – where the project focuses entirely on postharvest treatments, specifically stored cocoa and coffee beans;

(e) Zambia – where consumption is low (but with a reported potential for consumption increase as certain sectors such as flowers expand) and the project is still ongoing. Further, some problems with the adoption (and registration) of alternatives are reported;

(f) Zimbabwe reports high success, however phase-out in the tobacco sector is not yet complete and problems are reported. Grain storage is also included in the project.

99. A sector-by-sector analysis is suggested as a result of the proposed visits. Pests and diseases to be controlled in each of these may be different; production cycles, market requirements and consumer issues among others, are not the same. This would be in line with the previous evaluation conducted by the Multilateral Fund in 2005 where each major use sector was addressed separately, providing better opportunity to assess specific needs and constraints. Consideration of sectors that have successfully moved away from MB – even outside the region (in particular Eastern European countries where consumption has been zero for several years) may also provide very useful information.

100. In addition, it is suggested that further information be obtained by conducting face-to-face interviews with ozone officers and others, for example on the margins of the OEWG. Since such interviews would take place before the field visits, they would also be useful in confirming whether the choice of projects and countries is the most appropriate, and whether additional issues need to be considered (for example, way to address illegal trade/use of MB which is often referred to by ozone officers).

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Annex I

PROJECTS IMPLEMENTED WITH FUNDING FROM THE MULTILATERAL FUND IN AFRICA

Table 1 – Technical assistance and technology transfer projects

Country	Sector	Agency	Objective
Algeria	Postharvest (pulses)	UNIDO	Phase-out remaining use of 0.7 tonnes and prevent potential expansion of MB use in future.
Burkina Faso	Tobacco	UNIDO	Awareness raising, preventing future use
Cameroon	General	UNEP	Strengthening awareness raising, training of farmers and other users, supporting NOU
Ethiopia	General	UNEP	Strengthening awareness raising, training of farmers and other users, supporting NOU
Ghana	Melons	UNDP	Phased-out 10.5 ODP tonnes of MB bringing consumption to zero. Developed policy package, training, assistance in installation of alternatives
Kenya	General	UNEP	Strengthening awareness raising, training of farmers and other users, supporting NOU
Madagascar	General	UNIDO	Assistance to sustain MB phase-out.
Malawi	General - tobacco	UNDP	Technical assistance and training to support demonstration and investment projects
Mali	General	UNIDO	Awareness/training workshop
Mozambique	Soil fumigation	UNIDO	Preventing potential MB consumption increase, particularly in flowers and tobacco where there is a potential for consumption increase. Strengthen national legislation.
Nigeria	General	UNEP	Strengthening awareness raising, training of farmers and other users, supporting NOU
Regional	General	UNEP	Regional workshop for English-speaking Africa
Regional	Grain storage	Australia	Demonstration of alternative fumigation techniques in Kenya, Malawi, Zambia and Zimbabwe
Regional	General	UNDP	Data collection on MB consumption in Africa with the aim of developing regional strategies
Regional	General	UNEP	Regional workshop and survey in French-speaking Africa
Regional	General	UNEP	Regional training on alternative technologies (training of trainers)
Regional	General	UNEP	Policy development, develop tools for meeting 2002 freeze.
Regional	General	UNEP	Information exchange on successful alternatives, assistance for meeting 2002 freeze and 2005 20 per cent reduction
Regional	General	UNDP	Extensive work with LVC and zero consumers in Africa, to assist in meeting 20 per cent reduction step of 2005 where applicable, improve data collection, develop policy packages and action plans and prevent potential future use of MB in 29 African countries. Achieved phase-out of 2.5 tonnes of MB.
Senegal	General	UNEP	Strengthening awareness raising, enhance communication on MB alternatives, training of farmers and other users, supporting NOU.
Sierra Leone	Grain storage	UNEP	Phased out 0.67 ODP tonnes of MB. Training of customs officers, developing policy package, support awareness raising and training activities.
Zambia	General	UNEP	Strengthening awareness raising, training of farmers and other users, supporting NOU
Zimbabwe	General	UNEP	Strengthening awareness raising, training of farmers and other users, supporting NOU

Table 2 – Demonstration projects implemented in Africa under the Multilateral Fund*

Country	Sector	Alternatives	Agency	Comments
Botswana	Tomatoes and cucurbits	Substrates, biofumigation + solarisation, alternative chemicals	UNIDO	LVC, consumption increase was prevented.
Cameroon	Tobacco	Substrates and low-dose alternative chemicals	UNIDO	
Egypt	Horticulture	Strawberries, tomatoes, cucurbits, peppers	Germany	
Egypt	Grain storage	Phosphine + CO_2, modified atmospheres (high CO_2), hermetic storage	Germany	
Kenya	Cut flowers	Solarization, substrates, alternative chemicals, steam, within IPM approach	UNIDO	Follow up with investment project initially not successful, changed implementing agency.
Kenya	Stored grain and structures	Implementation of IPM systems for pest control in stored grain and structures	Canada	Alternatives had to be reconsidered.
Malawi	Tobacco	Floating trays, basamid, within IPM approach	UNDP	Became an investment project.
Morocco	Horticulture	Steam, substrates, solarisation, low-dose chemicals, within IPM approach	UNIDO	Steam proved unsuitable.
Morocco	Horticulture (tomatoes, cucurbits)	Enemy plants, organic amendments and grafting, within IPM approach	Germany	
Regional: Algeria and Tunisia	Postharvest (high moisture dates)	Modified atmosphere; heat; alternative chemicals, including ethyl formate + CO_2, phosphine + CO_2, sulphur dioxide and sulphuryl fluoride, within an IPM approach.	UNIDO	Only demonstration project ongoing
Tunisia	Post harvest (palm dates)	Phosphine, CO_2 and IPM	UNIDO	Alternatives not deemed successful.
Zimbabwe	Tobacco seedlings	Substrate production and low-dose chemicals	UNIDO	Laid good basis for investment stage.
Zimbabwe	Grain storage (maize)	Phosphine, nitrogen, diomataceous earth. Stacked maize bags under gas proof PVC sheets and plastic cocoons	UNDP	

*Some with bilateral agreements

Table 3 – Investment projects implemented in Africa under the Multilateral Fund

Country	Sector	Alternatives	Project status and implementing agency	Comments*
Cameroon	Stored commodities (cocoa, coffee, cotton and others)	Phosphine + IPM	ONG	Phosphine considered replacement for MB in terms of cost, effectiveness, availability, safety, and familiarity. The average temperature of Cameroon facilitates the application of this technology. Project addressed common problems with this alternative such preventing and managing development of resistance in treated pests and longer treatment times necessary. Reporting zero consumption since 2009.
Côte d'Ivoire	Stored commodities (cocoa beans)	Phosphine + CO2	FIN	Phase-out successfully achieved. Reporting zero consumption since 2004. Strong training component, including on maintenance of equipment supplied through the project. Users report satisfactory results.
Egypt	Horticulture	Medicinal lettuce substrates; cut flowers steam; strawberry biofumigation; strawberry nursery steam; melon and cucumber grafting; pepper, tomato substrates, grafting, biofumigation	1st tranche COM, 2nd tranche ONG	Projects helped Egypt comply with 20 per cent reduction of 2005. Strawberry runners reported as more difficult. Soilless production complemented with *Trichoderma* as a bio-control agent has been tested at a small-scale level with success. Strawberry nurseries have accepted that with this technology, it would be feasible to phase-out MB used for strawberry runners. Alternatives have been adjusted and changed according to requests from stakeholders. Implementing agency facilitated registration of chemical alternatives.
Egypt	Commodities and structural (except dates)	Phosphine (commodities), sulfuryl fluoride (structures)	1st tranche COM, 2nd tranche ONG	Implementing agency facilitated registration of chemical alternatives . Progress satisfactory Dates exempted from phase-out at present.
Kenya	Cut flowers	Steam and substrates	FIN	Steam too costly due to increasing fuel costs. Economic studies based on local market and export values revealed the effectiveness of the selected alternatives (substrates, metham sodium) as compared with MB. Local substrates available and performance adequate. Compliance with environment and health-related standards and regulations in international markets, set by developed countries, play an increasingly important role in a total phase-out of MB, particularly in cut flower sector. Final phase-out achieved by January 2010. However Government of Kenya and technical advisors warn that sustainability of alternatives cannot be ensured, due to varying costs, uncertain availability of locally sourced substrates that are cost effective, difficulties with recycling substrate, remaining need of awareness raising and information dissemination, especially with new farmers in the sector. Trade association not fully confident with sustainability of results.

Country	Sector	Alternatives	Project status and implementing agency	Comments*
Kenya	Horticulture	Alternative fumigants, floating trays	FIN	Project included case studies and surveys among growers (MB users) who reported that alternatives fit in with their cropping cycles and were easy to use. Substrates providing higher yields and better quality than when using MB, although initial setup costly. Bottom-up approach used, disseminating alternatives among key stakeholders who then help disseminate information. NOU warns about unknown sustainability of alternatives, need of awareness raising, especially with new farmers. Emerging diseases (bacterial wilt of tomato) indicated, alternatives need to be evaluated.
Kenya	Grain storage	Phosphine + cooling	ONG	Project using previously existing infrastructure, with cooling to enhance results. There is still scope for improvement of the technique.
Libya	Horticulture (tomatoes, cucumbers, peppers and others)	Solarization + fumigants, soilless "enarenado" system, grafting, IPM, alternative chemicals	1st tranche FIN, 2nd tranche ONG	The "enarenado" technique, although not previously used in Multilateral Fund projects, proved suitable for the particular conditions of Libya, particularly because it saves water. Long-term sustainability of these and other alternatives well addressed and seems appropriate.
Malawi	Tobacco	Floating tray system (FTS), IPM, alternative chemicals	FIN	Project took account of alternative for both high-tech users and smaller growers. The FTS was mostly adopted by larger previous consumers as inputs need to be imported at higher costs. High involvement of key stakeholders at all levels including Tobacco Associations, National Smallholder farmers. In general, phase-out considered technically, economically and commercially sustainable. Growers adopting this technique need to make investments and changes that make it more unlikely for them to return to old production practice requiring MB fumigation. However, recent reports claim that supplies are not readily available and very expensive.
Morocco	Cut flowers	Solarisation, alternative chemicals, steam	FIN	Sector totally phased-out. Use banned in country, not likely to return.
Morocco	Bananas	Solarisation, alternative chemicals, steam	FIN	Sector totally phased-out. Use banned in country, not likely to return.
Morocco	Strawberry	Solarisation, alternative chemicals, steaming, IPM	FIN	Sector totally phased-out. Use banned in country, not likely to return.
Morocco	Tomato	Solarisation, alternative chemicals, biofumigation, grafting, IPM	1-5th tranche FIN, 6th tranche ONG	Changes in initial technologies chose were approved and adjusted leading to much improved results. Implementing agency facilitated registration of chemical alternatives. Sector totally phased-out, grafted seedlings now locally sourced. Very strong training program, including research and demonstration centre, study tours to several countries.

Country	Sector	Alternatives	Project status and implementing agency	Comments*
Morocco	Horticulture (green beans and cucurbits)	Solarisation, alternative chemicals, biofumigation (first cycle), substrates (second cycle), nematicides (third cycle)	1st and 2nd tranche ONG	Adoption of alternatives progressing well. Composting now part of program, with good results reported.
Senegal	Peanut seed	Phosphine	FIN	Phase-out achieved. Results reported as satisfactory. Reporting zero consumption since 2000.
Uganda	Cut flowers	Steam + IPM (chrysanthemum cuttings) Metham sodium (roses)	FIN	Project helped country comply with 20 per cent reduction of 2005 (country previously out of compliance). Technical and economic feasibility of steam confirmed by stakeholders, alternative thus labelled as sustainable. Metham sodium applied with spading machine also introduced for roses, categorized as cost-efficient. Results reported as satisfactory as exporters can abide by international environmental requirements that ban MB use (ie eco-labels).
Zambia	Cut flowers + horticulture	Solarization, alternative chemicals, biofumigation	ONG	Experiences from similar sectors considered. Reports so far are promising. Some delays with registration of alternatives reported, but being addressed with help from the implementing agency. Problems with resistance to some pesticides reported.
Zambia	Tobacco	Floating tray system, low dose chemicals, solarisation	ONG	Experience from other tobacco sectors considered. Substrate locally sourced, economic feasibility improved. Trays apparently more difficult to source, need to be imported at high cost.
Zambia	Grain storage	Phosphine + IPM	ONG	Reported progress appropriate however NOU indicates limited effectiveness of alternative and difficulties in use, problems with sourcing equipment.
Zimbabwe	Cut flowers	Steam	FIN	Steam found to be technically feasible and initially readily adopted, however presently difficult to source fuel and flower industry much reduced – exports difficult due to low frequency of flights and diminished infrastructure.
Zimbabwe	Tobacco	Floating tray system	FIN	Previous demonstration project provided a sound basis for the selection of the best suited alternatives under Zimbabwean conditions. Trays adjusted to local requirements (less cells per tray to increase water and nutrient retention capacity of seedlings and local substrate sourced (pine bark). Alternative categorized as technically and economically feasible; although cost is higher than MB, smaller seedbed area is needed and higher grade tobacco is obtained. In the long term, the cost effectiveness is reported as higher. Recent reports however indicate costs constraints, training insufficient, supplies unavailable.
Zimbabwe	Grain storage (corn)	Phosphine + IPM	FIN	Implementation of alternative reported as very successful and leading to complete phase-out in sector, however recent claims that treatment time with phosphine is much longer causing logistical difficulties. Tarps necessary for treatment only included at later stage in project.

* From project reports, implementing agencies, CAP, and in selected cases, NOUs (Egypt, Kenya, Malawi, Morocco, Zambia, Zimbabwe).

Annex II

STATISTICAL OVERVIEW

Table 1 – Investment projects overview – Africa

(According to the Inventory: 33 projects in 11 countries)

	No. projects approved	Total funds approved (US $)	Average size of projects approved (US $)
1998	1	62,945	62,945
1999	1	1,006,652	1,006,652
2000	2	3,093,929	1,546,965
2001	3	1,628,800	542,933
2002	2	3,261,252	1,630,626
2003	2	1,037,247	518,624
2004	4	1,851,894	462,974
2005	3	3,276,481	1,092,160
2006	3	718,604	239,544
2007	4	3,057,239	764,310
2008	6	4,122,969	687,162
2009	-	-	-
2010	1	437,594	437,594
2011	1	287,700	287,700
Total	33	23,843,306	

Table 2 – Projects approved by type – Africa

Agency	TAS - TRA	Demonstration	Investment	Total
UNIDO	5	7	22	34
UNEP	14	-	-	14
UNDP[1]	3	2	41	9
Australia	1	-	-	1
Canada	-	1	-	1
France	-	-	1	1
Germany	-	3	3	6
Italy	-	-	2	2
Spain	-	-	1	1
Total	23	13	33	69

[1]Two additional tranches for Kenya were transferred.

Table 3 – Investment projects completed up to December 2011 – African countries

Agency	Projects approved	Projects completed	PCR received	PCR due
UNIDO	23	16	10	6*
UNDP	4	4	0	4
France	1	1	0	1
Germany	3	3	1	2
Italy	1	0	0	0
Spain	1	0	0	0
Total	33	24	11	13

* PCR NOT required for completed tranches of multi-year projects by UNIDO.

Table 4 – Technology choice for approved investment projects by African country
(According to the Inventory)

Country	MB to alternative chemicals	MB to biofumigation	MB to composting	MB to floating tray system	MB to grafting	MB to negative pressure steam	MB to phosphine	MB to phosphine + CO2	MB to solarization	MB to solarization with chemicals	MB to steam	MB to sulphuryl fluoride	MB to substrates (soil-less culture)	IPM approach
Cameroon						X								X
Côte d'Ivoire							X							
Egypt		X			X		X				X	X	X	X
Kenya	X			X			X				X		X	X
Libya		X			X					X				
Malawi				X										
Morocco	X	X	X	X		X				X			X	X
Senegal						X								
Uganda										X				
Zambia	X	X		X			X		X	X				X
Zimbabwe				X							X			X
Total	**3**	**4**	**1**	**5**	**2**	**1**	**5**	**1**	**1**	**4**	**3**	**1**	**3**	**6**

Annex III

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Annex IV

TERMS OF REFERENCE FOR THE SECOND STAGE OF THE EVALUATION OF METHYL BROMIDE PROJECTS (AFRICAN REGION)

Background and justification

1. At its 65th meeting the Executive Committee decided upon the opportunity of an evaluation of methyl bromide (MB) projects (decision 65/9). The Committee stressed the timing and need for the evaluation and indicated that it should focus on MB projects implemented in Africa.

2. A desk study has been undertaken, in which a consultant examined all existing documentation and interviewed professionals from the Multilateral Fund Secretariat and the implementing agencies. Results of the desk study are being presented at the 66th meeting of the Executive Committee. Preliminary conclusions and recommendations with regard to the sustainability of the MB phase-out achieved through MB projects were made, and relevant issues impacting such sustainability were identified.

3. The desk study addressed issues related to the feasibility and sustainability of current technical alternatives and the context within which they are applied. It considered alternatives implemented through the projects, issues relating to their technical and economic feasibility and hurdles or drawbacks to the adoption of such alternatives. Important parameters impacting sustainability were identified.

4. A follow-up field study in various countries aimed at further analysis and at devising a strategy to strengthen sustainability of MB phase-out achieved in Africa is now proposed as the second stage of the evaluation.

Objective and scope of the second phase of the evaluation

5. The second phase will yield several case studies primarily focusing on investment projects since these are intended to directly replace MB. Analyses of individual relevant use sectors as identified in the desk study will be conducted:

(a) Horticulture (including strawberries, tomatoes, peppers, green beans and other vegetables);

(b) Cut flowers;

(c) Tobacco seedlings;

(d) Postharvest (mainly grain storage).

6. Both successful and unsustainable phase-out cases should be recorded. Each case study should assess the following parameters more closely:

(a) An assessment of risks of returning to MB in African countries. Risks should be categorized and rated (low, medium, high). They should consider current access to MB, (e.g. if it is banned or still authorized in the country or sector), its price, formulation/presentation and others;

(b) A cost analysis of alternatives, to determine whether they are cost-efficient. If not available, collect to the best extent possible the relevant information. The central issue is to implement efficient soil pest and disease management strategies that allow for

profitable production, not comparing their performance to MB (given that this fumigant is phasing out anyway);

(c) An assessment of the main constraints to the adoption of alternatives. Acceptance by stakeholders, difficulties with getting products registered, market requirements, training required to work with new technologies, others;

(d) An assessment of training efforts conducted and further training needs;

(e) A case of successful phase-out (sustainable) and a case of failed adoption of alternatives (per sector if possible).

Methodology

7. A team of consultants will be hired to undertake visits from five to seven representative countries selected in the desk study (Table 1). They will gather further information and issue a final report with conclusions and recommendations aimed at improving the sustainability of phase-out strategies. A final report will synthesize the findings of both desk study and field visits and will make recommendations for the future.

8. Field visits will include discussions with growers and growers' representatives, staff of extension, research as well as the National Ozone Unit and regulatory agencies involved in project development and MB phase-out.

9. Specific questions will be formulated for each project to be visited; review and detailed analysis of all documents available (project documents, progress reports, project completion reports and technical reports) as well as discussions with ozone officers and implementing agencies will be considered when formulating questions.

Table 1 – Countries and projects selected for visits during the field study

Country	Sectors and alternatives	Phase-out status	Comments
Cameroon	Postharvest (stored cocoa and coffee beans) Phosphine + IPM	ONG	Phosphine considered immediate replacement for MB. Common problems with this alternative such as preventing and managing development of resistance in treated pests and longer treatment times necessary. Reporting zero consumption since 2009.
Egypt	Horticulture, flowers, strawberries – steam, substrates, grafting; biofumigation stored grain - phosphine	Ongoing	Strawberry runners reported as more difficult. Soilless + bio-controls successful at a small-scale. Alternatives have been adjusted and changed according to requests from stakeholders. Implementing agency facilitated registration of chemical alternatives. Phosphine in postharvest
Kenya	Cut flowers, horticulture, postharvest . (stored grain)	Completed for soils uses ongoing for postharvest	Steam too costly. Economic studies based on local market and export values support selected alternatives (substrates, metham sodium). Local substrates available and performance adequate. Final phase-out achieved by January 2010. However Government of Kenya and technical advisors warn that sustainability of alternatives cannot be ensured, due to

Country	Sectors and alternatives	Phase-out status	Comments
			varying costs, uncertain availability of locally sourced substrates, difficulties with recycling substrate, remaining need of awareness raising and information dissemination, especially with new farmers in the sector. Horticulture growers reported that alternatives fit with cropping cycles and were easy to use. Substrates providing higher yields and better quality than when using MB, although initial setup costly. Emerging diseases (bacterial wilt of tomato) indicated, alternatives need to be evaluated. For grain storage using previously existing infrastructure, with cooling to enhance results. There is still scope for improvement of the technique.
Malawi	Tobacco seedlings – FTS, IPM, alternative chemicals	Completed –	Project addresses high-tech users and smaller growers. The Floating Tray System was mostly adopted by larger users as inputs need to be imported at higher costs. High involvement of key stakeholders at all levels including. Phase-out considered technically, economically and commercially sustainable. Investments and changes make it more unlikely for them to return to MB fumigation. Reporting zero consumption since 2004.
Morocco	Horticulture – solarisation, chemicals, grafting, biofumigation IPM	Completed for tomato, strawberries, bananas, flowers, on going for vegetables	Changes and adjustments in initial technologies chosen made led to much improved results. Implementing agency facilitated registration of chemical alternatives. Sector totally phased out, grafted seedlings now locally sourced. Very strong training programme, including research and demonstration centre, study tours to several countries.
Zambia	Cut flowers, horticulture – solarisation, chemicals, biofumigationTobacco – FTS Grain - phosphine	On going for vegetables, cut flowers, tobacco seedlings, postharvest (stored grain)	Experiences from similar sectors considered. Reports so far are promising. Some delays with registration of alternatives reported, but being addressed with help from the implementing agency. Problems with resistance to some pesticides reported. Substrate for FTS locally sourced, economic feasibility improved. Trays apparently more difficult to source, need to be imported at high cost. For grain storage reported progress appropriate however limited effectiveness of alternatives and difficulties in use reported.
Zimbabwe	Cut flowers – steam Tobacco – FTS	Completed for cut flowers, on going for tobacco seedlings (FTS)	Phased out in cut flowers For tobacco, trays adjusted to local requirements and local substrate sourced (pine bark). Alternative categorized as technically and economically feasible; although cost is higher than MB, smaller seedbed area is needed and higher grade tobacco obtained.

10. In addition, face-to-face interviews will be conducted with ozone officers of these and other African countries, and other key persons, in the margins of the Open-Ended Working Group. Since such interviews will take place before the field visits, they will be useful in confirming whether the choice of projects and countries is the most appropriate, and whether additional issues need to be considered.

Outputs

11. The consultants will prepare analytical documents that should address, within the limits of existing data and the information collected, the issues mentioned above. Reports should be no longer than 35 pages, including annexes. Consultants will take into consideration comments received from members of the Multilateral Fund Secretariat, bilateral and implementing agencies. Reports should include clear recommendations for designing a strategy to strengthen the sustainability of MB phase-out in Africa.

12. Case studies will be submitted separately and made available for consultation.

13. A synthesis report compiling findings from the desk study and case studies will be prepared, and will contain final recommendations for future strategies.

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