UNITED NATIONS DEVELOPMENT PROGRAMME
Project of the Government of Costa Rica
PROJECT DOCUMENT

Number and Title:	**COS/02/G61/A/2G/99- Programme to Voluntarily Adopt Alternatives to Methyl Bromide**
Duration:	**60 Months**
ACC-UNDP Sector/Subsector:	**200 Environment/201 Policies Planning & Legislation**
National Implementation Institutions:	**MAG and MINAE**
Executing Agency:	**MINAE**
Estimated Starting Date:	**August 01, 2003**
UNDP Inputs:	**US$ 4,845,283***

Brief Description: Costa Rica needs urgent assistance for trying to reduce methyl bromide (MB) consumption to 570.8 tons (342.5 ODP-t) to achieve the freeze level of the Montreal Protocol. MB is used on more than 4,814 hectares in 7 Regions of the country, for melons, cut flowers, banana, tobacco seedbeds and nurseries. The project is based on results of demonstration projects in melon and cut flowers completed in Costa Rica (COS/FUM/27/DEM/14 and COS/FUM/27/DEM/15).
The executing agency is MINAE. A Steering Committee (CD), comprised of the Authorities of MAG and MINAE, the Resident Representative of UNDP Costa Rica, CANAPEM and ACOFLOR will provide strategic guidance to the Project. A Technical Committee, comprised of the Phytosanitary Directorate (MAG), COGO (MINAE), and a representative of universities will advice technical aspects of the project This project has been designed in three parts. (i) *Equipment and material acquisition* for agricultural sectors that use methyl bromide. (ii) *Training and technology transfer* for agricultural users of methyl bromide and trainers or extension agents providing services to current methyl bromide, and (iii) *Policy package*. MAG will be the national implementation institution for the two first parts of the project. For the third part MINAE, as regulator institution, will define national policies; while MAG will undertake institutional measures to ensure the permanent phase out of MB in the agricultural sectors.

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July 9, 2003
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The project will purchase and disburse incremental equipment and materials for alternative fumigants, biofumigation, solarisation, steam, substrates, seedtrays and other relevant alternatives. Training and technical support programs will be implemented according to the needs of different types of growers who are spread across more than 20 sub-regions. In the order of 532 technicians, farmers and farm workers need to be trained to a relatively high technical level, in addition to training of trainers, local specialists, technicians and extension personnel. The project will develop MB action plans and policy measures to ensure the sustainability of the phase-out programme. This is a performance based project, therefore on an annual basis the country will evaluate its execution previous to continuing with the project.

PROJECT IMPACT: The project will phase-out 426.9 ODP-t (711.5 tons) methyl bromide (based on average of last 3 years consumption). This covers all uses of MB, except for quarantine, pre-shipment and any uses exempt from Montreal Protocol controls.

*NB: This overall MB programme has been approved in principle at a budget of $4,845,283. The first tranche of $1,211,320 was funded at the 35th ExCom. Attached, please find UNEP/OzL.Pro/ExCom/35/67, the Agreed Conditions for Phaseout of MB in Costa Rica between the Government and the Executive Committee. This agreement contains the schedules for reduction of ODP/yr and the corresponding disbursement of funds in tranches. During project execution the estimation of QPS will be reviewed to ensure precise data in official records.

Legal Context.: This project document shall be the instrument referred to as such in the Standard Basic Assistance Agreement between the United Nations Development Programme and the Government of the Republic of Costa Rica, signed by the parties on August 7th, 1973 and enacted by the Law 5878 published in "La Gaceta" on January 31m 1976. This project document shall be governed by normal UNDP practices regarding project revisions/monitoring/evaluation, and by special procurement procedures applicable to the Montreal Protocol Programme.

The Government of Costa Rica is submitting a project to phase out all the methyl bromide (MB) used for soil disinfestation in melons, cutflowers, tobacco seedbeds and nurseries representing the total consumption in the country except for quarantine and pre-shipment applications. The project conditions will try to attain that imports of MB to Costa Rica be adjusted as follows: 2002: 570.8 tons (342.5 ODP tons); 2004: 422.5 tons (253.5 ODP-tons); 2006: 283.2 tons (169.9 ODP-tons); 2008: 0 tons; the latter, based on the project's performance.

Further, the project will be implemented in accordance with the Agreement between the Executive Committee of the Multilateral Fund for the implementation of the Montreal Protocol and UNDP signed on 21 August 1991 and the project proposal approved by the Executive Committee at it's Thirty-Fifth (December 2001) Meeting in Montreal, Canada. In the Copenhagen Amendment of the Montreal Protocol, the Article 5 Parties have agreed to phase-out methyl bromide. Costa Rica ratified this Amendment in November 1998.

MINAE will be the National Executing Agency. A Steering Committee (CDN), comprised of the Ministers of Environment and Agriculture, the Presidents of the Cut Flowers Growers' Association (ACOFLOR) and the Melon Growers' Association (CANAPEM), and the Resident Representative of UNDP will provide strategic guidance to the Project. A Technical Committee, comprised of the Phytosanitary Directorate (MAG), COGO (MINAE), a consortium from agricultural technology transfer centers within Costa Rican academic and research institutions, and the technical advisors appointed by the Growers Association will advice the management of the project This project has been designed in three parts. (i) *Equipment and material acquisition* for agricultural sectors that use methyl bromide. (ii) *Training and technology transfer* for agricultural users of methyl bromide and trainers or extension agents providing services to current methyl bromide, and (iii) *Policy package*. The MAG will be the national implementation institution for the two first parts of the project. For the third part MINAE, as regulator institution, will define national policies; while MAG will undertake institutional measures to ensure the permanent phase out of MB in the agricultural sectors.

The following types of revisions may be made to this project document with the signature of the UNDP Resident Representative only, provided he or she is assured that the other signatories of the project document have no objection to the proposed changes:

- Revisions which do not involve significant changes in the objectives, outputs or activities of the project, but are caused by the rearrangement of inputs already agreed to or by cost increases due to inflation;

- Mandatory annual revisions, which re-phase the delivery of agreed, project input or increase expert or other costs due to inflation or take into account agency expenditure flexibility.

Project for the Government of the Republic of Costa Rica

UNDP/ PROJECT BUDGET

Country: Costa Rica
Project Number: COS/02/G61/A/2G/99
Project Title: Programme to Voluntarily Adopt Alternatives to Methyl Bromide

Line	Budget Items	Total US$	Year 1	Year 2	Year 3	Year 4	Year 5
33.01	Training & technology transfer (a)	631,993	157,998	126,399	126,399	126,399	94,799
39	Sub-total training/tech transfer	631,993	157,998	126,399	126,399	126,399	94,799
45.02	Equipment and materials	3,830,263	957,566	766,053	766,053	766,053	574,539
49	Sub-total Equipment and materials	3,830,263	957,566	766,053	766,053	766,053	574,539
53.01	Contingency 10%	383,026	95,756	76,605	76,605	76,605	57,454
59	Sub-total equipment & materials	383,026	95,756	76,605	76,605	76,605	57,454
99	Total (b)	4,845,283	1,211,320	969,057	969,057	969,057	726,792
	Budget disbursement per year (c)	100%	25%	20%	20%	20%	15%
	Maximum MB imports (metric tons) per year (d)		570.8	570.8	422.5	422.5	283.2

a) Including contracted personnel, international/regional experts, policy development, training materials, technology transfer activities
b) Funds are contingent on meeting the conditions of MF ExCom (reproduced in annex 8 of project document)
c) Disbursements specified in conditions of MF ExCom
d) Reductions and phase-out exclude quarantine and pre-shipment.
e) The Steering Committee and UNDP-MPU may adjust the budget and project activities as necessary to ensure that the MB reductions will be achieved.

PROJECT COVER SHEET

COUNTRY:	Costa Rica
PROJECT TITLE:	Project to adopt alternatives in melon, cut flowers, banana, tobacco seedbeds and nurseries, leading to methyl bromide phase-out in Costa Rica
SECTOR/SUB-SECTOR:	Methyl bromide: all sectors
ODS USE IN SECTOR:	
Baseline (1995-98 average):	342.5 ODP-tons (570.8 tons) excluding QPS
Current (1998-2000 average):	426.9 ODP-tons (711.5 tons) excluding QPS
ODS USE IN ENTERPRISE:	426.9 ODP-tons (711.5 tons) excluding QPS
PROJECT IMPACT:	Phase out 426.9 ODP-tons methyl bromide
PROJECT DURATION:	60 months
IN BUSINESS PLAN:	Yes
COPENHAGEN AMENDMENT:	Ratified

PROJECT COSTS:	**TOTAL**	**COUNTERPART**	**MLF REQUEST**
Incremental capital cost	6,205,343	1,743,086	4,462,257
Contingency *10%* (on equipment)	383,026	0	383,026
Incremental operating cost	586,180	586,180	0
Total	**7,174,549**	**2,329,266**	**4,845,283**

LOCAL OWNERSHIP:	100%
EXPORT COMPONENT:	Up to 16% (13.6-15.6% direct by farmers)
REQUESTED FROM MF:	$ 4,845,283 in 5 tranches: Year 1: 1,211,320 Year 2: 969,057 Year 3: 969,057 Year 4: 969,057 Year 5: 726,792
COUNTERPART:	$ 2,329,266 (48% of total MLF request)
COST-EFFECTIVENESS:	$11.35 per ODP-kg
AGENCY SUPPORT COSTS:	$ 542,981 (13% ($65,000) against the initial $500,000; 11% (477,981) against the remainder of the project budget)
MONITORING MILESTONES:	Yes
IMPLEMENTING AGENCY	UNDP
NATIONAL IMPLEMENTING INSTIONS:	Ministry of Agriculture and Livestock (MAG) Ministry of Environment and Energy (MINAE)
EXECUTING AGENCY:	MINAE
COUNTERPARTS:	MAG, Melon growers' association (CANAPEM); and, Agricultural extension organisation (BUN), Public Universities and research centres.

PROJECT SUMMARY

Costa Rica needs urgent assistance for reducing MB consumption to 570.8 tons (342.5 ODP-t) to achieve the freeze level. MB is used on more than 4,814 hectares in 7 Regions of the country, for melons, cut flowers, banana, tobacco seedbeds and nurseries. The project is based on the successful results of the COGO-UNDP demonstration projects for melon and cut flowers completed in Costa Rica (COS/FUM/27/DEM/14 and COS/FUM/27/DEM/15), and advice from meetings with MB users and international experts.

MINAE will oversee national execution of this project. A Steering Committee, comprised of the Ministers of Environment and Agriculture, the Presidents of the Cut Flowers Growers' Association (ACOFLOR) and the Melon Growers' Association (CANAPEM), and the Resident Representative of UNDP will provide strategic guidance to the Project. A Technical Committee, comprised of the Phytosanitary Directorate (MAG), COGO (MINAE), a consortium from agricultural technology transfer centers within Costa Rican academic and research institutions, and technical advisors appointed by the Growers' Associations will advise the management of the project.

The project has been designed in three parts. (i) *Acquisition of MeBr alternative equipment and materials* for agricultural sectors that use methyl bromide; (ii) *Training and technology transfer* for agricultural users of methyl bromide and trainers or extension agents providing services to current methyl bromide users; and, (iii) *Development of a comprehensive policy package* to allow for the control and sustainable elimination of MeBr use in Costa Rica. The MAG will be the national implementation institution for the two first parts of the project. For the third part MINAE, as regulator institution, will define national policies, while MAG will undertake institutional measures to ensure the permanent phase out of MeBr in these agricultural sectors.

The project will purchase and disburse equipment and materials that cover the incremental operating costs of the transfer to alternatives to MeBr use including: alternative fumigants, biofumigation, solarisation, steam pasteurisation, substrates, seedtrays and other relevant alternatives. Training and technical support programs will be implemented according to the needs of different types of growers who are spread across more than 20 sub-regions. In the order of 532 technicians, farmers and farm workers need to be trained to a relatively high technical level, in addition to training of trainers, local specialists, technicians and extension personnel. The project will develop MB action plans and policy measures to ensure the sustainability of the phase-out programme.

PROJECT IMPACT: The project will phase-out 426.9 ODP-t (**711.5** tons) methyl bromide (based on average of last 3 years consumption). This covers all uses of MB, except for quarantine, pre-shipment and any uses exempt from Montreal Protocol controls.

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JUSTIFICATION FOR PROJECT

Certain substances, such as CFCs, halons and methyl bromide, deplete the earth's protective ozone layer, allowing increased amounts of UV-B radiation to reach the earth. The additional UV-B increases the cases of eye cataracts and skin cancer, and can have harmful effects on farm animals, wildlife, certain crops, fish production, forest trees, and materials like plastic and rubber. In 1987 the governments of the world established the Montreal Protocol, an international agreement to control ozone-depleting substances (ODS).

In 1992 methyl bromide was officially listed as an ODS under the Montreal Protocol, and international phase-out schedules were later developed. It is important for all nations to reduce and phase-out their use of ozone-depleting substances, so that our ozone shield can recover.

Costa Rica needs substantial assistance to achieve the freeze level, which means that prompt action needs to be taken to reduce national consumption to a maximum of 570.8 tons (342.5 ODP-tons). Costa Rica is committed to meeting the 20% reduction step and making further reductions, leading to MB phase-out.

The Costa Rican economy depends strongly on agricultural production. Methyl bromide is economically important because it is used in the production of crops, which are economically important and bring essential foreign exchange into the country. Costa Rican growers are experiencing intense competition from other growers in Central America, so they are forced to use the cheapest available soil treatment, which is currently MB. It is expected that importing countries such as the USA will impose restrictions on Central American growers after the USA phases out MB in January 2005.

This project will address the need to reduce reliance on MB by transferring alternative technologies to all MB users and assisting with the eligible incremental (i.e. additional) costs of alternatives. When alternatives have been established successfully in all sectors it will be feasible to phase-out this ODS in Costa Rica. It is essential to address the problem of MB in ways that will not damage the rural economy and will not threaten the livelihoods of farmers. The project has been carefully designed to achieve these objectives.

The project complies with the provisions of the Revised Strategy and Guidelines for Projects in the Methyl Bromide Sector (UNEP/OzL.Pro/ExCom/32/44), as follows:

- Costa Rica has ratified the Copenhagen Amendment of the Montreal Protocol
- Costa Rica is a traditional user of MB and has rapidly accelerated its use. As such it is eligible for an investment project.
- The project covers priority crops identified in the Guidelines: cucurbits, cut flowers and seedbeds.
- The project will be accompanied by a package of policy measures as required in paragraph 23 of the Guidelines.
- The selected alternatives are listed in the Guidelines.

- The project is based on the needs of growers (MB users) and will be implemented by growers associations and local organizations with support from experts, making use of all the relevant agricultural institutions in the sector.
- Costa Rica is willing to commit to specific national aggregate MB reductions as milestones in the project.

METHYL BROMIDE CONSUMPTION

National consumption of MB

Table 1 shows the national consumption of MB since 1995. This data was compiled from customs records and the Ministry of Agriculture Pesticide Registration Bureau. The data shown in Table 1 has been reported officially to the Ozone Secretariat. (During project preparation Costa Rica had an opportunity to identify the MB used for quarantine and pre-shipment for the years 1995 to 1998. The amended information was transferred to the Ozone Secretariat.)

Use of MB increased significantly in the last decade due to the economic development of the horticultural sector in Costa Rica. Consumption decreased temporarily in 2000 to 650 tons primarily because the price of melons dropped so fewer hectares were planted. Also, pest pressures have varied from year to year according to the weather and other factors. In 2001 the MB consumption is expected to be at least 650 tons, but consumption will be much higher if melon prices improve in some areas and if pest problems increase.

It is well recognized that the consumption of MB in agriculture fluctuates from year to year due to fluctuations in pest pressures and other factors. For this reason the MB consumption for this project is based on the average reported for the last three years (1998-2000), which is **711.5** tons (426.9 ODP-tons).

The MB baseline consumption is 570.8 tons (342.5 ODP-tons), based on the 1995-98 average, excluding quarantine and pre-shipment.

Costa Rica is listed as one of the countries that may have difficulties in meeting the MB freeze (UNEP/OzL.Pro/ExCom/34/16). The Multilateral Fund's Sub-Committee on Monitoring, Evaluation and Finance stated in its report of July 2001 that 'Urgent action by all concerned was required in order to ensure that as many countries as possible would be able to achieve compliance.' (UNEP/OzL.Pro/ExCom/34/4, para 30). Costa Rica needs to take urgent action to meet the freeze during 2002.

Table 1: National MB consumption in Costa Rica

Year	Metric tons		
	Controlled MB	QPS	Total
1995	419.4	130.6	550.0
1996	459.8	140.2	600.0
1997	676.0	169.0	845.0
1998	727.8	172.2	900.0

1999	756.8	189.2	946.0
2000	650.0	200.0	850.0

Crops and uses of MB

In Costa Rica the majority of MB is used for melon production, followed by cut flowers. The minor uses are banana, nurseries and seedbeds of tobacco and vegetables as shown in Table 2. MB is not used for stored products. About 200 tons is currently used for quarantine and pre-shipment treatments.

Table 2 – Breakdown of MB consumption by crop/use (average 1998-2000)

Crops/uses of MB	MB consumption by crop	
	Percentage	Metric tons
SOIL FUMIGATION:		
Melon	83%	590
Cut flowers	15%	107
Banana	1.8%	13
Tobacco seedbeds, nurseries	0.2%	1.5
Sub-total soil	**100%**	**711.5**
Total excluding QPS	**100%**	**711.5**
QPS	-	187.1
Total including QPS	-	**898.6**

MB USE BY SECTOR

MB is used in diverse crops, regions and climates of Costa Rica, by many small farms, as well as medium and large farms.

Melon sector

Melon production uses more MB than any other sector in Costa Rica, accounting for about 83% (590 tons) of MB. Since the early 1980s, melon production techniques have developed based on MB, so the production methods and sector rely heavily on this fumigant. MB is used because it is convenient, effective in controlling a broad spectrum of pests, and cost-effective. The soil-borne pests include:

- Nematodes - particularly *Meloidogyne* spp., also *Pratylenchus, Helicotylenchus, Tylenchus, Aphelenchoides, Criconemella*
- Fungi - *Fusarium, Pythium, Rhizoctonia, Verticillium* and others
- Weeds - especially *Cyperus rotundus*, also *Cleome viscosa, Commelina* spp., *Echinocloa colona, Panicum reptans, Digitaria* spp., *Eleusine indica, Rottboellia cochinchinensis, Caperonia* spp., *Phyllanthus niruni, Chamesyce* spp., *Baltimora recta*
- Soil-borne insects
- Bacteria

Soil types vary greatly from one region to another, and even within the same field very different soil types are found. The microclimates also vary substantially from one field to the next. Melons are produced in three main regions:

a) Guanacaste (North Pacific)
Main area of melon production (80%). Long dry season with possibility of two crops per year.

b) Orotina and Parrita (Central Pacific)
20% of melon production, rainy regions.

MB is used only in open fields, and is applied in the period from October to February. It is normally injected in rows using injection equipment attached to the front of a tractor, and plastic sheets are laid on top of the treated soil. The recommended MB application rate is 250 kg/ha for injected MB, but it can fluctuate from 180 kg/ha to slightly higher doses.

There are many small melon producers, with farms of about 2-3 hectares. There are also about 30-40 medium and large producers. About 5 of these farms account for more than half of the MB consumption. Farms sizes range from less than one hectare to more than 100 ha in some cases. Melon farms are owned and operated by Costa Rican companies and farmers. The smaller farms have little access to technical information or research; they follow the recommendations of agrochemical suppliers or try to follow the techniques used on larger farms. The melon growers association (CANAPEM) represents small and medium producers. Large growers are not in the association. The project includes both CANAPEM and the large independent growers.

The medium-size farms tend to have some technical management, but do not have greenhouses or other technical infrastructure on the farm. The large farms (more than 100 ha) have efficient production with high technical input and greenhouses for their own seedling production.

The value of the melon production is more than $62.6 million. Melons are sold on the domestic market and exported to Europe, the USA and other countries. Growers are suffering extremely heavy competition from other parts of Latin America (for example, Guatemala and Honduras) where labor costs are lower. Melon prices have fallen significantly, making the economic situation very difficult for growers and obliging them to use MB, which is the cheapest pest control method.

Cut flower sector

The cut flower sector is the second-largest MB user in Costa Rica, accounting for about 15% (107 tons) of MB. MB is applied regularly when soil disinfestation is required. MB is used because it is relatively cheap and the waiting period is short so it does cause expensive delays before planting the next flower crop. The soil-borne pests include:

- Nematodes - *Meloidogyne, Helicotylenchus, Tylenchus, Rotylenchus, Criconemella, Hemicycliophora, Heterodera, Pratylenchus*

- Fungi such as *Fusarium, Pythium*
- Weeds such as *Cyperus rotundus*
- Bacteria, such as *Erwinia, Pseudomonas*
- Insects such as *Phyllophaga*

As in the melon sector, the soil types vary from one area to another. Cut flowers are produced in the following regions:

a) Central Valley region:
   90% of flower production is concentrated in greenhouses in the large Central Valley region at elevations from 1000 to 2000 metres above sea level. The main flower types are Chrysanthemum, Gerbera, Anthurium, and many other varieties, normally produced in plastic greenhouses. The topography is diverse, varying from flat areas (with drainage problems) to steep slopes, which have volcanic soils with high clay and organic matter content.

b) Caribbean zone:
   10% of MB use in flower sector is for tropical flowers in the Caribbean zone. The main flowers are *Musa*, produced in open (unprotected) fields. The tropical weather conditions promote pest development year-round.

MB is applied in two main ways:

In greenhouses: MB is applied when specific pest or disease problems develop. A pipe is laid across the soil area to be treated and covered with plastic sheet and the edges are 'sealed' with wet soil or other heavy material. The MB gas is then released through the pipe and diffuses into the soil. The recommended dose is a minimum of 0.45 kg per m^2, which is equivalent to about 450 kg/ha.

In open fields: MB is applied only when specific disease problems develop. A can of MB is laid on the infected area of soil and covered with a plastic sheet. The MB is released manually – the farmer uses a small device to make a hole in the can and the gas diffuses under the sheet. The dose is 450 g per 10-15 m^2, equivalent to 450 kg/ha.

Farm sizes vary from 5 to 25 ha in the Central Valley, where most MB is used. The larger farms are found in the Caribbean zone and produce only tropical flowers in open fields. The sector employs about 2200 people. It supplies the domestic market and exports to Mexico, USA, Canada and Europe. The value of the flower sector is more than US$ 24.4 million. The flower sector faces heavy competition and high labour costs. Alternatives generally have higher labour costs, which is a significant disadvantage.

The flower growers association (ACOFLOR) represents the small, medium and large growers.

Banana sector

Banana uses a smaller amount of MB, accounting for about 2% (13 tons) of MB. It is used only when Moko disease develops.

There are 3 main regions where MB is applied for banana:
a) Atlantic
b) North Atlantic
c) South Pacific

When there is a problem with Moko disease the growers apply MB in a similar way that open field flower growers apply MB. The dose and method is similar.

The sector has an organization called CORBANA which develops research and implements technology transfer to banana growers. They receive funds from special taxes paid by the producers.

Seedbeds

A minor amount of MB, about 0.2% (1.5 tons), is used for many small seedbeds of tobacco and vegetables. The main soil-borne pest problems are:

- Nematodes – *Meloidogyne* sp.
- Fungi – *Phytophtora*, *Pythium*, *Rhizoctonia*
- Weeds – *Cyperus*, Rice, *Amaranthus*, *Echinochloa*

The main region where MB is used for seedbeds is the Central Valley. Farms are typically small, and specialize in tobacco or vegetable production.

Normally the application is similar to that described for tropical flowers. The dose is 450 g each 10-15 square meters. There is no association or group that includes the farmers in this sector.

Crop area that relies on MB

Table 3 provides a summary of the crops, MB application rates (doses) and area treated with MB. In total, more than 4,814 hectares relies on MB fumigation (based on average consumption in 3 years prior to project preparation).

Table 3 – Crop area that relies on MB fumigation

Crop	MB used (tonnes)	Dose (kg/ha)	Notes	Field area that relies on MB (ha)
Melon	590.0	250, rows	Rows are 59% of field area	4,000 ha field area
Cut flowers	107.0	450	Greenhouses: 90% of MB. Applied every 2 years	214 ha x 2 = 428 ha
			Field: 10% of MB. spot treatments	23.8 ha of spot treatments (so much larger area depends on MB)
Banana	13.0	450	Spot treatments	28.9 ha of spot treatments (so much larger area depends on MB)

Tobacco and nurseries	1.5	450	Assume 100 m^2 beds gives seedlings for 10,000 m^2	33,333 m2 seedbeds gives 333.3 ha final crop
Total	711.5			More than 4,814 ha

Percentage of direct exports

A survey was carried out during project preparation to determine the percentage of exports and direct exports to non-Article 5 countries. The survey found substantial differences in the percentage of experts for the various crops and farm sizes. While medium and large melon farms export more than 80% of the harvest, only a small percentage is exported directly by farms – the vast majority of farms sell their products to other companies and traders who then carry out the exportation. The full survey results are presented in Annex 4. The total percentage of direct exports to non-Article 5 countries is about 13.6 - 15.6 %.

NATIONAL APPROACH

Costa Rica ratified the Montreal Protocol in 1991 and the Copenhagen Amendment in 1996. Costa Rica has completed two demonstration projects with UNDP on methyl bromide, covering melons and cut flowers (COS/FUM/27/DEM/14 and COS/FUM/27/DEM/15), and a small communications project with UNEP. Costa Rica is requesting this sectoral investment project, which will permanently phase-out MB. The project builds on the results of the demonstration projects. It is designed to reduce and phase-out MB, so that Costa Rica can comply with the Montreal Protocol phase-out requirements.

This project is listed in UNDP's Business Plan for 2001 and is fully compatible with Costa Rica's Country Program and national strategy on ODS.

SELECTION OF ALTERNATIVES

Strategy

The selection of alternatives varies according to the crop, type of grower, soil type, and local climate, so several different techniques will need to be adopted in each crop/region. The strategy is guided by factors important to growers and MB users, and anticipated market pressures relating to MB:

- Alternatives need to be effective in controlling target pests
- Cost-effective
- Appropriate to the technical level of different types of growers
- Meet market requirements for quality, fruit size, harvest timing
- Able to meet future market pressures on MB phase-out
- Sustainable, environmentally-sound techniques for the longer term

To reduce MB consumption to the freeze/baseline level the project will focus initially on growers who can adopt alternatives and reduce the frequency of MB applications. After achieving the 20% reduction step the project will also focus on the adoption of more environmentally-friendly, non-toxic alternatives.

The alternatives will be established on parts of farms in stages, to minimize the risk of crop losses, and to allow successful adjustment of alternatives to the diverse local microclimates and soil types found on farms. The growers and growers associations will take a lead role in implementing the project through technical advise which will be established in each crop/region.

Selected alternatives

The alternatives selected for melons are based on the melon demonstration project results, and the alternatives selected for greenhouse cut flowers are based on the results of the cut flowers demonstration project (summarised in Annex 5). For crops that were not covered by the demonstrations, alternatives were selected after reviewing alternatives used in other countries for tobacco, open field flowers, banana and vegetable nurseries. Integrated Pest Management (IPM) will form an important basis for all the alternatives. This will require the identification of pest species, increased hygienic practices (e.g. cleaning of tools before moving from one greenhouse area to another) and pest monitoring. The main alternatives to be adopted are as follows:

a) Fumigants – the fumigants metham sodium and 1,3-D provide adequate control of most soilborne pests when they are applied properly, although they need to be combined with other treatments or practices (using an IPM approach) in order to control the same spectrum of pests as MB. Much improved soil preparation and appropriate application are essential when using these alternative fumigants.

b) Biofumigation and solarisation - augmented with other treatments these can provide sufficient control in regions with suitable climate (high solar radiation and low rain during the treatment period), such as parts of Guanacaste. Solarisation is not suitable for regions like Parrita and Orotina. Organic amendments were found to be sufficiently effective in very specific, limited areas where pest pressures are lower, as found in limited parts of Guanacaste. Efficacy can be increased by combining them with other treatments.

c) Steam – when used with an IPM approach, steam can provide an effective pest control system for greenhouse production of cut flowers in diverse climates. The steam application systems need to be tailored for different soil types.

d) Substrates and seedtrays – local substrates are effective for flower propagation beds and some seedbeds. The floating seedtray system is particularly effective for tobacco seedlings.

PROJECT OBJECTIVES, IMPACT AND MILESTONES

The project has four main objectives:

1. To work urgently to reduce MB imports to the Baseline level of 570.8 tons (342.5 ODP tons) during 2002.

2. To carry out training and technology transfer programs for all MB users, in stages, so that cost-effective MB alternatives can be successfully established on farms during 2002 – 2006.

3. To purchase and disburse relevant agricultural equipment and materials to farms in stages, in coordination with the training/technology transfer program.

4. To develop with stakeholders and relevant government departments an action plan and policy package to promote MB phase-out, and to ensure that MB will not be re-introduced after phase-out.

The Montreal Protocol requires Costa Rica and other Article 5 countries to phase out MB by 2015. This project aims to phase-out MB by 2008, or earlier if feasible.

The project milestones are listed in Annex 4. Progress in meeting the milestones and achieving project activities and objectives will be monitored regularly by the Advisory Committee and UNDP-MPU. The project coordination team will provide quarterly and annual reports to UNDP-MPU.

Sustainability of alternatives and phase-out

The project has been designed to lead to sustainable reductions and phase-out of MB. The selected alternatives have been proven in commercial practice in other countries. The project will encourage local companies to set up production of key alternative inputs and materials in the medium term, so that the prices become more affordable for farmers. This will ensure the long-term sustainability of the alternatives.

The training program will be implemented by and with growers' organisations and leading growers, to ensure their active support. The training and technical assistance will be thorough, so that growers will fully understand how to use and manage alternatives successfully, to avoid crop failures and minimise the tendency to fall-back on using familiar MB technology. The MB phase-out is fully supported by key counterparts in the sector. The project strategy will provide a sustainable phase-out of MB. The project will be supported by policy measures to ensure that the MB phased out by this project will not be re-introduced.

PROJECT DESCRIPTION

The project activities are divided into several parts, as follows.

Procurement of equipment and materials

Table 5 shows the area of crops where alternative equipment and materials are required by farms who use MB. The total area is more than 4,814 hectares. The

project will purchase batches of equipment and materials to allow the MB users to establish alternative technologies, synchronized with the training and technology transfer program. This will help to overcome the substantial economic and technical barriers that currently prevent many farmers from making a transition from MB to alternatives

The project coordination team will order equipment/materials in a timely manner, and arrange temporary storage if necessary, followed by transportation to farms that use MB in each region.

Table 5. Estimated area of alternatives to be adopted in major Regions.
Total crop area = more than 4,814 hectares

Province or region	Area where alternatives need to be adopted (hectares) (a)			
	Metam sodium, other alternatives	Biofumigation, solarisation	Steam	Seedtrays
North Pacific	2,205	566		14
Central Pacific	940			13
South Pacific	27			13
Atlantic	30		151	13
Central Valley		284	279	27
Total	3,202	850	430	80

(a) The alternatives will be introduced in an IPM framework.

Training and technology transfer

It is important to note that Costa Rican farmers depend greatly on MB. The demonstration project found that substantial changes need to be made in agricultural practice and cropping systems in order to introduce the alternatives successfully. Even alternatives like metam sodium are not 'drop in' replacements. For this reason the alternatives will be established on parts of farms in stages, to minimize the risk of crop losses, and to allow successful adjustment of alternatives to the diverse local microclimates and soil types found on farms. The role of on-site training and technical advice will therefore be crucial to the success of MB phaseout.

The demonstration project covered only melon and greenhouse cut flowers, so additional work is required to transfer and adapt alternatives from other countries to meet the needs of open field flower farmers, banana, tobacco seedbeds and vegetable nurseries. The demonstration project covered only melons grown in the major regions and major climates/soil types – in reality melons are produced under many different microclimates and soil types, where the selected alternatives will have to be adjusted to meet local conditions.

The project needs to train well in excess of 480 farmers, farm technicians and farm workers, in addition to training of trainers, local specialists, technicians and extension personnel. The distribution by region is shown in Table 6. Many farms are scattered and diffuse in more than 20 sub-regions, with long distances between farms.

Table 6. Summary of training needs in major Regions.

Region	Estimated number to be trained in alternatives				Total
	Melon	Flowers	Banana	Other crops	
North Pacific	130			7	137
Central Pacific	42	40		6	88
South Pacific			22	6	28
Atlantic		40	88	6	134
Central Valley		132		13	145
Total	172	212	110	38	532

Training and technology transfer will consist of two parts:

Training of trainers.
In each sector, specialists in the selected alternatives will train local crop specialists how to use alternatives effectively, covering practical and relevant theoretical aspects, as well as necessary IPM approaches. Training will be conducted under the auspices of the project team and the crop/region committees set up with the growers associations. Training will need to cover the diverse soil types and microclimates found in the production areas of Costa Rica. A technical manual will be produced for each crop. In the case of cut flowers, the UNEP technical manual (due to be published in 2001) will be adapted to suit the local pests/situations.

Training and technology transfer for farmers, farm workers and farm technicians.
Farmers/technicians/workers and relevant personnel will be trained to use relevant alternatives in the following sectors in about 20 sub-regions:
Melon
Greenhouse cut flowers
Open field flowers
Banana
Tobacco seedbeds
Vegetable nurseries

Training will take place on farms, and has to be tailored to local conditions, which vary greatly from one region to the next. Farms will receive follow-up technical assistance and specialist help in adapting the techniques to their local situation. Field days will be organized so that other growers can see the results of alternatives.

For MB users in Costa Rica there are few state extension services. The centres of agricultural technology transfer located in universities currently play a significant role in providing technical assistance to growers, and these specialists will take a leading role in implementing technology transfer in the MB phase-out project.

The small and medium-size farms are often members of the growers associations: ACOFLOR for cut flowers and CANAPEM for the melon sector, and these provide a channel for reaching the small and medium growers in particular. The banana sector also has an association called CORBANA. The growers associations will take a lead role in implementing the project, through local project committees, which will be established in each sector (one for each crop/region).

In Costa Rica and other countries where use of MB is heavily entrenched, the production systems have developed based on MB. There are high pest pressures and diverse microclimates, and growers are dispersed in different regions of the country. It is therefore necessary to introduce alternatives in such a way that it will not harm farmers' livelihoods, economies and employment in rural areas. It is necessary to introduce alternatives, which are economically sustainable in the longer term.

Policy package

As required by the MF project guidelines, the project has to implement a package of policy measures to ensure that the MB eliminated by this project will not be re-introduced at a later stage. Dialogue will be undertaken between MB users, other stakeholders and relevant government departments, to develop an action plan for each crop sector. It will identify feasible policy actions by government and constructive voluntary activities that could be undertaken by growers, their associations and other stakeholders. This will help the smooth transition away from methyl bromide, and minimize the disruption to agriculture and markets. The action plan will also help to ensure that the implemented alternatives will be both economically and environmentally sustainable. A labeling and certification system is envisaged as one part of the plan. MB import control systems and regulations will also be adopted/amended as necessary, so that Costa Rica will be able to meet its commitments to the Montreal Protocol.

The workplan is given in the Annex.9. The detailed workplan will be drawn up with stakeholders after project approval.

ORGANISATION AND ADMINISTRATION OF PROJECT

Stakeholder consultation and participation

Project personnel put substantial effort into building a relationship with growers and involving them fully in the demonstration project. As a result, growers and growers' associations became involved in discussions and planning, and key growers agreed to host the demonstration trials on their farms. The demonstration project carried out awareness raising and information exchange with farmers, such as workshops and field days. Substantial input from MB users, experts and other stakeholders has provided a firm foundation for the proposed phase-out project. Meetings with international experts and growers were held in Costa Rica as an essential part of preparation for the phase-out project.

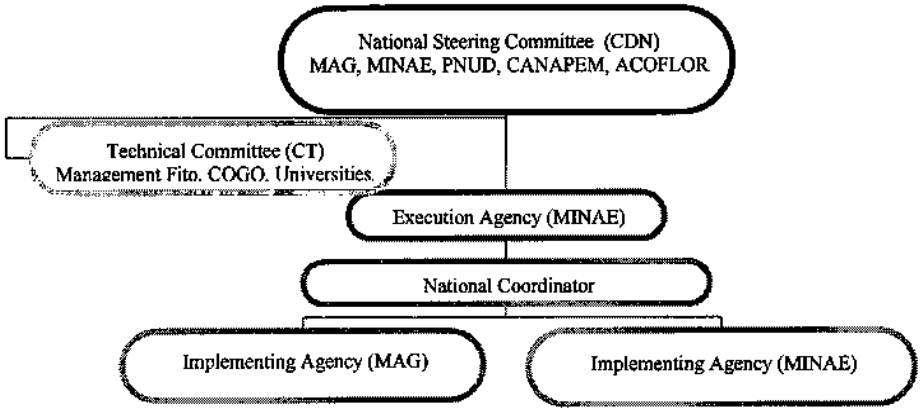
Producers representatives have pledged support to address the problem of MB. The growers and growers associations will take a leading role in the investment project implementation. Local groups will be set up to administer the activities of training and technology transfer in each crop/region.

Existing agricultural infrastructure

Relevant existing technical and extension facilities in the country will be used to the extent possible. Within MAG, the Phytosanitary Directorate, the Organic Production Unit, and the Conservationist Agriculture Unit currently provide technical support to producers. Also public universities (UCR, UNA, ITCR, UNED) currently provide specialized technical assistance to growers, through their *Centros de Transferencia de Tecnología Agrícola*. Finally, two effective non-government extension agencies (BUN, CEDECO) currently provide extension for small, medium and larger farms, particularly those who need a significant input of technical information.

Administrative arrangements

As per agreed between MAG and MINAE, the project will be implemented in accordance with the following graph:



MINAE will oversee national execution of this project. A Steering Committee, comprised of the Ministers of Environment and Agriculture, the Presidents of the Cut Flowers Growers' Association (ACOFLOR) and the Melon Growers' Association (CANAPEM), and the Resident Representative of UNDP will provide strategic guidance to the Project. A Technical Committee, comprised of the Phytosanitary Directorate (MAG), COGO (MINAE), a consortium from agricultural technology transfer centers within Costa Rican academic and research institutions, and technical advisors appointed by the Growers' Associations will provide technical advice to project execution.

The project has been designed in three parts. (i) *Acquisition of MeBr alternative equipment and materials* for agricultural sectors that use methyl bromide; (ii) *Training and technology transfer* for agricultural users of methyl bromide and trainers or extension agents providing services to current methyl bromide users; and, (iii) *Development of a comprehensive policy package* to allow for the control and sustainable elimination of MeBr use in Costa Rica. The MAG will be the national implementation institution for the two first parts of the project. For the third part MINAE, as regulator institution, will define national policies, while MAG will undertake institutional measures to ensure the permanent phase out of MeBr in these agricultural sectors.

Annex 7 details roles and responsibility of each decision making and implementing body.

PROJECT COSTS

The incremental costs of equipment and technology transfer and training are shown in Annex 1. Annex 2 gives the calculations of incremental operating costs/savings.

The counterparts will make contributions to the project: time of technicians and specialist personnel, time attending meetings and project activities, office space, office equipment, communications transport, tools and agricultural equipment, logistic support, laboratories and laboratory equipment for pest and soil analyses. The value of these counterpart contributions amounts to more than $2,329,266.

The project budget is summarized in Table 7.

Table 7: Summary of MF funds requested for project

	Total cost (US$)
Equipment and materials	3,830,263
Contingency (10% equipment & materials)	383,026
Training and technology transfer	631,993
MF request total	**4,845,283**

ANNEX 1 Calculation of incremental capital costs

Baseline MB equipment:
In open fields: MB is injected into the soil via MB injection equipment placed on a tractor.
In greenhouses: MB is released manually under plastic sheets from cylinders.
In seedbeds: MB is released from small cans manually.

Area where alternatives need to be adopted: approx. 4,814 hectares.

Table A1 : Incremental capital costs of equipment, technology transfer and training

Alternatives	Items	MF request US$
Metam sodium and other alternatives	Modification of existing equipment, rotovator-spaders	2,209,863
Biofumigation, solarisation	Rotovator-spaders, agricultural materials	136,000
	Temperature monitors	170,000
Steam pasteurisation	Steam boiler systems (large & medium)	920,000
	Temperature monitors	86,000
Float systems	Seedtrays, pool construction materials, microtunnels, manual seeding devices, EC meters	58,400
Technology adaptation: soil and pest analysis, misc. chemicals and materials	For crops that did not benefit from demonstrations	250,000
Sub-total		3,830,263
Contingency (10% of equipment & materials)		383,026
Total equipment & materials		4,213,289
Training and technology transfer	Personnel, international experts, training of trainers, technical assistance on farms, transport, other training costs, policy development and adoption	631,993
Total funds from MF		4,845,283

According to the agreed institutional responsibilities (see annex 7) the annual breakdown of the budget will be approved by the CDN, except for year 1, which is agreed upon and is included as annex 9.

Table A2 – Budget allocation by year

Year (a)	Percent	US$
Year 1 (2002)	25%	1,211,320
Year 2 (2003)	20%	969,057
Year 3 (2004)	20%	969,057
Year 4 (2005)	20%	969,057
Year 5 (2006)	15%	726,792
Total	100%	4,845,283

(a) Years 2 – 5 agreed in principle, according to the text of the Agreed Conditions of ExCom given in final Annex below.

Notes on budget items in Table A1:

(a) Table A1 includes only incremental equipment, i.e. additional/extra to the MB equipment used at present. Systems for injecting metam sodium are generally more effective than the injection of metam sodium via drip irrigation (where the metam may not penetrate to sufficient depth to control nematodes, and will not touch nematodes between the rows). Proper soil preparation is essential, as is the distribution of alternative fumigants evenly in the soil. Rotovator-spaders are essential for this work and are will proven in Europe, South Africa and other countries. The incremental cost is calculated on the cost of changing the existing MB system so that alternatives can be used effectively. For references on the importance of soil preparation, see Mulder.

(b) Both steam and biofumigation / solarisation will require temperature monitoring to ensure that the treatments are applied effectively. The equipment will be shared between farmers where feasible. The demonstration project did not purchase thermometers.

(c) Boilers will be distributed in the MB using regions according to the number of growers in the regions, surface area to be treated, species of flowers and nursery plants, months of treatment, and other relevant factors. Calculations for the boilers are as follows:

One boiler can treat: approx. 0.5 ha/ day
Total area to be steamed: 428 ha flowers + approx. 26,000 m^2 nurseries
= approx 430 ha
Days required to treat total area: approx. 860 days
Geographical locations of farms: 5 provinces: more than 30 sub-regions
Geographical spread: Some clusters in Central Valley diffuse in most regions
Number of extra boilers required: estimated 10 large + 6 medium

The demonstration project purchased two small portable boilers. These two boilers will be used to eliminate MB in several small nurseries. The calculation of extra boilers required took full account of the existing boilers – they were not double-counted. Counterparts will contribute to the costs of steam systems.

(e) The parameters used to determine the floating tray system were as follows:

Number of trays per ha:	85
Number of cells per tray:	288 cells
Area of seedlings necessary for 1 ha crop:	$25m^2$

(f) Soil analysis is not carried out when MB is used, and is not part of the baseline cost. The demonstration project found that soil analysis is essential in Costa Rica because the type of soil varies greatly from one field to another. Soil analysis is necessary for identifying which treatment to use in a given location.

(g) Specialists/technicians will organise and implement the training and technical assistance on farms in each crop and region that uses MB:

- Melons – training in relevant alternatives: fumigants, biofumigation/solarisation, grafting, IPM techniques.
- Cut flowers – training in steam and relevant IPM techniques (similar to Colombia cut flower alternative system)
- Banana – training in alternatives for monitoring and control of Moko disease in particular.

- Tobacco – training in the floating tray system.
- Vegetable nurseries – training in seedtrays and other relevant alternatives

The cost of the training and technology transfer program includes additional work required for the adaptation of alternatives to the crops and climates that were not covered in the demonstration project.

The training program will make use of the relevant agricultural infrastructure. A meeting of growers and international experts held in Costa Rica as part of project preparation noted that the prime source of technical information for growers are the university specialists who provide practical information. Farmers/workers need to be properly trained in alternatives to ensure they will be able to use them competently and effectively in future.

(h) ExCom Guidelines on MB projects state that projects must include policy dialogue and must develop a package of policy measures to ensure that MB phased out will not be reintroduced. To meet this requirement, Costa Rica will have preliminary dialogue with stakeholders, develop a paper on policy options, determine best options with stakeholders, introduce necessary policy measures and action plans, carry out action plans, and monitor and enforce the policy package.

ANNEX 2: Calculation of incremental operating costs

The parameters of the incremental operating costs are shown below.

Operating costs of metam sodium and MB in open field lines (US$ per hectare)						
	Qty	unit price	Year 1	Year 2	Year 3	Year 4
Methyl bromide:	250 kg/ha rows	5	1,250.00	1,250.00	1,250.00	1,250.00
Plastic	339 kg	339	339.00	339.00	339.00	339.00
Labour	30 d	12	360.00	360.00	360.00	360.00
Savings			**1,949.00**	**1,949.00**	**1,949.00**	**1,949.00**
Metam sodium	625 l	2	1,250.00	1,250.00	1,250.00	1,250.00
Plastic	339 kg	339	339.00	339.00	339.00	339.00
Additional soil prep	fuel		32.00	32.00	32.00	32.00
Labour	30 d	12	360.00	360.00	360.00	360.00
Costs			**1,981.00**	**1,981.00**	**1,981.00**	**1,981.00**
Balance			32.00	32.00	32.00	32.00
Discount factor			0.91	0.83	0.75	0.68
Net present value			29.12	26.56	24.00	21.76
Eligible incremental cost						**101.44**

Operating costs of biofumigation + solarisation and MB in open field (US$ per hectare)						
	Qty	unit price	Year 1	Year 2	Year 3	Year 4
Methyl bromide:	250 kg/ha	5	1,250.00	1,250.00	1,250.00	1,250.00
Plastic	339 kg	339	339.00	339.00	339.00	339.00
Labour	30 d	12	360.00	360.00	360.00	360.00
Savings			**1,949.00**	**1,949.00**	**1,949.00**	**1,949.00**
Organic matter	90 t	12.9	1,161.00	1,161.00	1,161.00	1,161.00
Plastic UV resistant	339 kg	351	351.00	351.00	351.00	351.00
Additional soil prep			32.00	32.00	32.00	32.00
Labour	34.5 d	12	414.00	414.00	414.00	414.00
Costs			**1,958.00**	**1,958.00**	**1,958.00**	**1,958.00**
Balance			9.00	9.00	9.00	9.00
Discount factor			0.91	0.83	0.75	0.68
Net present value			8.19	7.47	6.75	6.12
Eligible incremental cost						**28.53**

Operating costs of float system for seedlings (US$ per hectare of crop)						
	Qty	unit price	Year 1	Year 2	Year 3	Year 4
Methyl bromide:	8 lb	2.7	21.60	21.60	21.60	21.60
Plastic	100 m	0.32	32.00	32.00	32.00	32.00
Seeds	8 g	1.05	8.40	8.40	8.40	8.40
Fertilizer	7kg	0.35	2.45	2.45	2.45	2.45
Pesticides	3 cc		1.71	1.71	1.71	1.71
Labour	3.5 days	12	42.00	42.00	42.00	42.00
Translplant labour	8 days	12	96.00	96.00	96.00	96.00
Savings			**204.16**	**204.16**	**204.16**	**204.16**
Substrates	6 80 l bag	17.5	105.00	105.00	105.00	105.00

Replacement trays	85 trays	110.5	0.00	0.00	0.00	110.50
Pelleted seeds	25,000 seeds		30.00	30.00	30.00	30.00
Fertilizer	3kg	2.50	7.50	7.50	7.50	7.50
Pesticides	20 cc		3.30	3.30	3.30	3.30
Labour	2 d	12	24.00	24.00	24.00	24.00
Translplant labour	5 days	12	60.00	60.00	60.00	60.00
Costs			**229.80**	**229.80**	**229.80**	**340.30**
Balance			25.64	25.64	25.64	136.14
Discount factor			0.91	0.83	0.75	0.68
Net present value			23.33	21.28	19.23	92.58
Eligible incremental cost						**156.42**

Operating costs of steam and MB in greenhouses (US$ per hectare in greenhouse)						
	Qty	unit price	Year 1	Year 2	Year 3	Year 4
Methyl bromide:	450 kg/ha	5	2,250.00	2,250.00	2,250.00	2,250.00
Plastic	435 kg	435	435.00	435.00	435.00	435.00
Labour	32 d	12	384.00	384.00	384.00	384.00
Savings			**3,069.00**	**3,069.00**	**3,069.00**	**3,069.00**
Fuel	6400 l	0.42	2,688.00	2,688.00	2,688.00	2,688.00
Own tractor	11 h	12	132.00	132.00	132.00	132.00
Labour	36 d	12	432.00	432.00	432.00	432.00
Costs			**3,252.00**	**3,252.00**	**3,252.00**	**3,252.00**
Balance			183.00	183.00	183.00	183.00
Discount factor			0.91	0.83	0.75	0.68
Net present value			166.53	151.89	137.25	124.44
Eligible incremental cost						**580.11**

It is well recognised by agricultural economists that the operating costs of one technology will vary greatly from one country to the next, according to the local price of MB, the necessary application rate of alternatives, the local cost of labour, whether inputs have to be imported (can increase the price substantially), the degree of mechanisation, and other important factors. There are known cases where the operating costs of the floating tray system are higher than MB – this is particularly the case where growers are small and there is no possibility for mechanisation of the planting of seedlings. The operating cost of steam is higher than MB largely because more labour time is required, as shown above. The operating cost of metam sodium is higher largely because of the additional, essential soil preparation.

Table A3 : Estimated incremental operating costs and savings

Alternative	Crop area	Cost (US$/ha)	Total (US$)
Metam sodium and alternatives	3,203 ha	101.44	311,725
Biofumigation, solarisation	850 ha	28.53	23,965
Steam	430 ha	580.11	240,166
Seedtrays	80 ha	156.42	10,324
Total			**586,180**

ANNEX 3: Project Timetable Milestones

YEAR	2002				2003				2004				2005				2006			
QUARTER	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Contract signed	■																			
Equipment bids prepared	■																			
1ST Equipment .& inputs contract awarded	■				■															
Training contract awarded	■																			
Training of trainers	■	■			■	■														
1st batch inputs delivered		■																		
Report on progress and results (a)	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
1º Training/tech assistance for farmers			■	■																
2nd batch inputs delivered					■	■														
2ºº training/tech assistance for farms						■	■	■												
3rd batch inputs delivered									■	■										
3rd Training/tech assistance implemented										■	■	■								
4th batch inputs delivered													■	■						

4th training/tech assistance implemented														■	■	■		■	■	
5th batch inputs delivered																	■	■		
100%Training implemented																		■	■	■
Development policy package	■	■	■	■																
Implementation of policy and crop action plans			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

(a) The coordination team will submit a quarterly progress report to UNDP-MPU on the last day of each quarter, describing activities carried out, contracts awarded, disbursements made, progress in meeting milestones, etc. Annual report: the report for the final quarter of each year will be an annual progress report submitted to UNDP-MPU by the last day of November each year – it will include latest MB consumption data and progress achieved in meeting the MB reductions required in the Agreed Conditions of the project shown in the final Annex below.

ANNEX 4: Survey identifying direct exports from Costa Rica

Crops	*Categories of farms*	*Percentage of MB use*	*Destination of harvest*		*Of exports...*		***Direct exports to non-A5s as percentage of total***
			Domestic or exports to A5s	*Exports to non-A5s*	*Indirect exports (via another company)*	*Direct exports to non-A5s*	
Melon 83% of MB use	Large and some medium farms	49.8%	10% of harvest on large/med farms	90% of harvest on large/med farms	100% sold to other companies who export	0%	**0 %**
	Medium and small farms	33.2%	15%	85%	92-95 % sold to other companies who export	5 - 8%	**2 - 3 %**
	Other small farms	0%	100%	0%	0%	0%	**0 %**
Cut flowers 15% of MB use	Large and medium farms	13.5%	20-25%	75-80%	0%	100% of exports	**10 - 11 %**
	Small farms	1.5%	25-27%	73-75%	0%	100% of exports	**1.5 %**
Banana	All	1.8%	3%	97%	95%	5 %	**0.1 %**
Tobacco seedbeds, nurseries	All	0.2%	100%	0%	0%	0%	**0 %**
Total		100%					**13.6 – 15.6 %**

ANNEX 5: Summary of demonstration project results

1. Melon sector demonstrations

The following alternatives were tested using an IPM approach:
Solarization
Cover crops (*Mucuna* sp).
Organic amendments (compost and organic by-products).
Soil fumigants (metam sodium, dazomet, 1-3 D, chloropicrin).
Other pesticides and new formulations.

1.1 Results of melon demonstrations

Nematodes
Important plant pathogenic nematodes need to be controlled to avoid substantial crop losses. The reproductive capacity of *Meloidogyne,* for example, is remarkable in Costa Rican conditions: it can increase the population density approximately 200 times in 30 days. A general decrease of nematode population was observed after all the treatments, to varying degrees, although none of the treatments were as effective as methyl bromide overall. It was observed that alternative treatments were generally much less effective in poorly tilled soils and heavy soils. The type of soil, soil moisture, temperature and other factors all changed the effectiveness of evaluated products. Alternative fumigants 1,3-D and metam sodium can provide sufficient control provided there is additional and very thorough soil preparation and other techniques and practices are also applied to enhance their efficacy, such as removal of nematode hosts.

Fungi and bacteria
Pathogenic fungi like *Fusarium* spp, *Rhizoctonia* spp and *Pythium* spp are among the most common pathogens. Organic amendments increase microorganism populations, other treatments specially fumigants decrease general populations. Dazomet, injected fumigants, and vermicompost reduced phytopathogens in particular. However dazomet was found to be phytotoxic; vermicompost has to be applied in large quantities.

Weed control
Treatments with dazomet, metham sodium and 1,3-D can be effective alternatives to Methyl Bromide in weed control. Organic amendments like compost were not effective against general weeds, but provided good control against some species like *Digitaria* spp and *Cleome viscosa* weeds. Cover crops and solarization treatments show effective results for certain weed species, but they need to be implemented two or three seasons to show the best results.

1.2 Conclusions

The demonstration trials identified certain effective alternative treatments for melon in Costa Rica. In most cases alternatives need to be combined (used together in an IPM system) in order to control the full spectrum of pests. They are suitable for specific regions and types of growers:

Alternative A – Biofumigation/solarization. suitable for locations with appropriate climate, and specific types of melon growers. It is suitable for introduction in certain dry areas of Guanacaste, only in cases where farms can leave the soil without crops during the long treatment period. Solarization is much more effective when combined with other techniques. In rainy areas like Parrita and Orotina solarization is not suitable.

Alternative B – Cover crops. It is suitable for certain types of farms, if they do not have flooding problems during the rainy season. Management of this alternative needs to be improved because the cover crop must be cut before seed production and incorporated into soil. It must be combined with other techniques, and is suitable for introduction in the region of Guanacaste as part of an IPM system.

Alternative C – Organic amendments. Compost can be sufficiently effective in specific, limited areas where pest pressures are lower. It is suitable for some growers in the region of Guanacaste as part of an IPM system. It needs to be applied in large quantities.

Alternative D - Soil fumigants. Metham sodium is one of the more promising treatments for weed control. Dazomet and 1,3-D are more suitable on specific conditions or nematode problems. Chloropicrin is not suitable because it is very difficult to apply by farmers (intoxication and allergic problems were detected among field workers). These alternatives can be made suitable for various climates, although they need to be adapted to suit the soil type and microclimate. They need to be combined with other practices to be fully effective. Additional and thorough soil preparation is essential before applying the fumigants, and injection is normally necessary for achieving sufficient soil depth and spread.

Alternative E – Other pesticides. The tested pesticides were not found sufficiently effective for soil disinfestation.

Alternative F - New formulations. A new formulation of 1,3-D called Telone EC was used in the second trials, although the first application of this product using the normal equipment of farms was too difficult.

The demonstration project has shown that all of these alternatives must be implemented under an IPM program, because proper pest monitoring is the key of success. Farms do not carry out pest and soil analysis when methyl bromide is used because the fumigant is effective under a much wider range of conditions than the alternatives. The soil type and microclimates vary greatly in Costa Rica, in some cases varying even within each field, and it is essential to analyse these factors before farmers/specialists can determine the most appropriate combination of techniques for each field.

The demonstration trials were carried out in strategically-selected locations; the scope of the demonstration project did not permit trials in the many different microclimates found in Costa Rica. The foreseen methyl bromide phase-out project will therefore be obliged to adapt the alternatives to local conditions in areas that were not covered by the demonstration trials.

To reduce methyl bromide consumption urgently to meet the Protocol schedules it is foreseen that it will be necessary to rely on injected toxic fumigants (1,3-D, metham sodium) combined with practices such as special soil preparation and soil/pest analysis, and additional IPM soil techniques to ensure that crops will not fail. For the long term it is desirable to improve the environmentally safer techniques so that farms will be able to adopt environmentally sound alternative systems.

Cut flower sector

2.1 Alternatives tested

Steam treatments
Organic amendments: compost and vermicompost.
Fungicides (ZT/Hydrogen Peroxide, *Tricoderma* spp.)
Nematicides (Biostat/*Paecilomyces lilacynus*, Nemout/Hipomycetes fungi).

All of these were tested in combination with IPM techniques to monitor the efficacy of alternative treatments in controlling soil-borne pests.

2.2 Results of cut flower demonstrations

Nematodes

There are several important nematode species that are controlled by methyl bromide at present. A general decrease of nematode population was observed after all the treatments, but to varying degree. It was observed that in areas with poor soil drainage and aeration soil treatments were generally much less effective. Steam, when properly applied, is the most effective treatment, and can be as effective as methyl bromide under correct conditions. *Paecilomyces* and Hipomycetes fungi showed good nematode control.

Fungi and bacteria

Pathogenic fungi such as *Fusarium* spp, *Rhizoctonia* spp and *Pythium* spp are examples of common pathogens of cut flowers. Demonstration plots showed slight incidence of bacterial damage in cut flowers. All non fumigant treatments showed an increase in non pathogenic organisms (number and species). Steam was a viable treatment because it has a rapid treatment time comparable to methyl bromide. Also, biological controls (*Tricoderma*) do not need for reaction time. In some plots, the combination of steam and *Tricoderma* showed good control of *Fusarium*, leaving *Aspergillus* (a non pathogenic fungi) in the soil.

Weed control

Important weeds in flower demonstration plots include *Drimaria villosa* and *Cardamine* sp., also in some plots *Amaranthus hibridus, Cyperus esculentus* and *Cyperus rotundus*. Steam was the most effective and rapid treatment identified.

2.3 Conclusions

The results of the demonstration trials show that it is necessary to use a combination of techniques in order to replace methyl bromide. The most effective alternative system for cut flowers is an Integrated Pest Management system similar to the

systems used in Colombia, based on steam treatments, pest/disease monitoring, preventive measures, high standards of hygiene, use of substrates, biocontrols, and selective pesticides in spot treatments when necessary. This system can be adapted to suit the needs of the different types of cut flower growers in Costa Rica.

3. Economic aspects

The demonstration project carried out an economic analysis of the different technologies. It found that the investment costs of all alternatives, especially fumigants and organic amendments create a barrier to the introduction of alternative technologies. Low market prices for farm products and high labor costs in Costa Rica lead most growers to use methyl bromide because it is the cheapest available method. The operating costs of alternative systems were also found to be higher than methyl bromide, requiring special soil preparation and other additional costs.

The study concluded that most types of growers, particularly the small and medium-size growers, do not have resources available to make the investment in alternative technologies. In the current economic climate even the large-scale growers do not have the required resources to change. The profit margins on melons are very small or negligible because of the high competition. Assistance and training will be necessary to overcome the barriers to the introduction of alternatives.

4. Stakeholder awareness and participation

Growers and growers' associations became involved in discussions and planning, and key growers agreed to host the demonstration trials on their farms. The project carried out awareness raising and information exchange with farmers:

Workshops at start of demonstration projects, including input from international experts in alternatives for melon and cut flowers
Many meetings with growers and growers' associations and other stakeholders
Distribution of leaflets and publicity materials
Production and distribution of an informative video
Field days at the demonstration sites to discuss progress
Reports on the demonstrations
Final project workshops

In addition, during project preparation a meeting with international experts and growers was held in Costa Rica, to learn from other countries and discuss options and approaches for the MB phase-out project. COGO has also established an interim Advisory Committee to provide guidance on key aspects of the project. The substantial input from all these experts and stakeholders has provided a firm foundation for the proposed phase-out project.

ANNEX 6: Job descriptions

Post title:	Coordination team (3 persons, part-time)
Duration:	2002 – 2006 part time contracts
Duties:	• Coordination of project work for 5 crops: melon, cut flowers (greenhouse and open field), banana, tobacco and vegetable nurseries • Procurement, and storage if necessary, of equipment and materials, and distribution to farms • Organisation of work of trainers and specialists • Development and implementation of workplans • Financial accounting • Provision of quarterly reports to COGO, Advisory Committee and UNDP-MPU • By last day of November each year: annual progress report to UNDP-MPU (for Multilateral Fund Secretariat report)

Post title:	Technical specialists: steam for greenhouse flowers and nurseries
Duration:	2002 – 2004 contracted for required periods
Duties:	• With project team, develop and implement training of trainers in effective steam techniques. • Adapt steam technologies to crops that were not covered in the demonstration project (i.e. vegetable nurseries). • Modify and make effective any steam equipment already present on farms.

Post title:	Technical specialists: IPM for cut flowers
Duration:	2002 – 2006 contracted for required periods
Duties:	• Working with project team, develop and implement training of trainers in effective IPM techniques for cut flowers. • Adapt IPM technologies for crops that were not covered in the demonstration project (i.e. banana, open field cut flowers) and for climates not covered in the flower demonstration.

Post title:	Technical specialists: fumigants for field crops
Duration:	2002 – 2006 contracted for required periods
Duties:	• Working with project team, develop and implement training of trainers in effective fumigant techniques, minimising potential environmental impacts. • Adapt fumigant applications to crops that were not covered in the demonstration project (i.e. vegetable nurseries) and to soils/climates not covered in the melon demonstration.

Post title:	Technical specialists: float tray system for tobacco seedbeds, seedtrays for veg nurseries
Duration:	2002 – 2006 contracted for required periods
Duties:	• Working with project team, develop and implement training of trainers in effective use of the tobacco float system. • Adapt the float tray system to cooler climates where necessary. • Adapt seedtray methods to crops that were not covered in the demonstration

	project (certain nurseries).

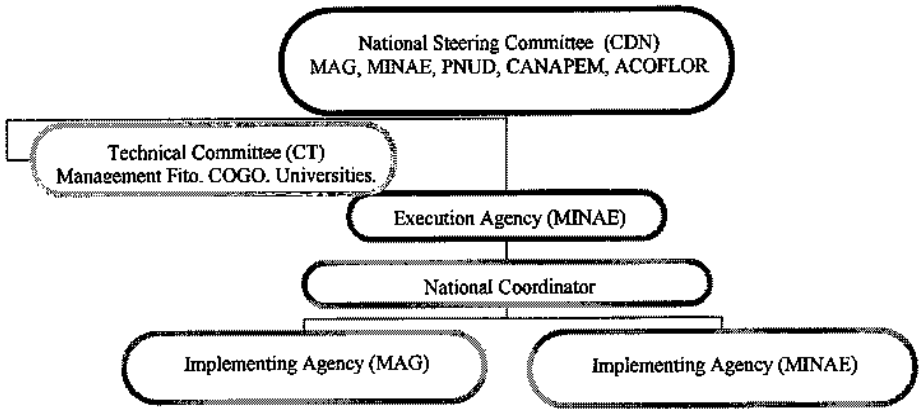
Post title:	Technicians (farmer training)
Duration:	2002 – 2006 contracted for required periods
Duties:	• Implement training and provision of technical information for farmers, technicians and farm workers in the following crops: melon, cut flowers (greenhouse and open field), banana, tobacco and vegetable nurseries • Provide targeted extension activities, e.g. field days

Post title:	National technical specialists (farmer training)
Duration:	2002 – 2006 contracted for required periods
Duties:	• Provide specialist technical assistance to farmers for particular pest/crop production problems that arise during MB phase-out • Assist technicians with field days and specialist technical information

Post title:	Policy specialist (policy package)
Duration:	2002 – 2006 contracted for required periods
Duties:	• Iin full consultation with stakeholders, identify options for policy and voluntary activities to assist MB phase out, and develop a policy package and instruments, which will ensure the sustainable phase-out of MB. • Monitor MB imports, national consumption, and progress in meeting the MB reduction schedule (Annex 8).

ANNEX 7: Agreed Institutional Arrengments.

As per agreed between MAG and MINAE, the project will be implemented in accordance with the following graph:



7.1 Roles and Responsibilities

National Steering Committee (CDN)
This committee will be composed of:

- Head of the Ministry of Agriculture and Livestock (MAG based on its initials in Spanish) or his/her representative
- Head the Ministry of the Environment and Energy (MINAE based on its initials in English) or his/her representative
- Resident representative of the UNDP – Costa Rica
- President of the Chamber of Melon Producers
- President of ACOFLOR

The CDN will meet at least once each year, or whenever the members may deem it necessary, to:

- Approve the annual work plan and budget.
- Ensure coordination between project stakeholders.
- Provide guidance and evaluate the recommendations from the Technical Committee for achieving project objectives.
- Provide information and disseminate project results.
- Make decisions based on what is established in the section on Legal Context.

Technical Committee
The Technical Committee will be composed of:

- The Director of the MAG Phytosanitary Protection Services
- COGO
- Public universities (participation depending on strengths with regard to the issue to be discussed)
- Technical personnel designated by the chambers

The Technical Committee will meet quarterly, or as may be deemed necessary, to:

- Provide assessments to the coordinating team about technical elements such as validating technological proposals, geographic focuses, etc.
- Provide information dissemination about project performance.

Implementation Agencies

The implementation agencies are organizations that provide services and perform activities such as acquiring and delivering programme or project supplies, and their conversion into programme or project products. In this project there are two implementation agencies: the MAG and MINAE .

The project has been designed in three parts.

- *Equipment and material acquisition* for agricultural sectors that use methyl bromide. The MAG will be the implementation agency for this part.
- *Training and technology transfer* for agricultural users of methyl bromide and trainers or extension agents providing services to current methyl bromide users. The MAG will be the implementation agency for this second part.
- *Policy package.* MINAE and the MAG will implement this part in close coordination with each other. MINAE , as the governing institution, will define national policies and coordinate, with the MAG, any measures to ensure their permanency in the agricultural sectors.

Project Director

The National Project Director will be designated by MINAE within the division that the Minister may believe to be pertinent. The Project Director's responsibility is to:

- Ensure political support for the project.
- Ensure institutional coordination.
- Supervise the Project Coordinator.
- Provide supplies to the Technical and Steering Committees for strategic project issues.

The Coordinator

The Coordinator is responsible for daily project performance and coordinating and supervising execution of project activities. The Coordinator will work in close coordination with the implementation agencies and ensure that the project is an integral part of MINAE structure. The Coordinator's responsibilities include:

- As a priority, the Coordinator will identify producers interested in participating in Phase I of the programme, from within both the cut flower and melon sectors.
- In coordination with UNDP preparing terms of reference (TORs) and hiring and purchasing processes based on UNDP procedures.
- Identifying support staff qualifications that may be necessary for proper project execution and, based on UNDP procedures, collaborating in the annual hiring of this staff.
- Supervising project field work coordination in the melon producer and cut flower (greenhouse and open field) sectors, as well as in the banana, tobacco, and tobacco seedling-producer sectors.

- Ensuring that UNDP procedures are complied with in relation to purchasing, storing, distributing, and supplying materials and equipment for implementing and adopting the alternatives in an efficient manner.
- Supervising the development and implementation of extension and training programmes, including training for trainers and agriculturalists.
- Cooperating with the respective MINAE and MAG departments in implementing a political measures package to ensure full methyl bromide reduction.
- Organizing and supervising the work of the national trainers, specialists, and extension agents.
- Preparing a detailed work plan annually, by region and sector, consistent with the plan for reducing methyl bromide usage, showing all the activities related to training, monitoring, extension, and control for efficient and full reduction as indicated in the Agreed Conditions (see attachment). The Annual Work Plans have to be approved by the National Steering Committee; and,
- Prepare Progress Reports annually in collaboration with UNDP - Costa Rica and UNDP – Montreal Protocol Unit (MPU), to be submitted to the Executive Committee of the Multilateral Fund for the Implementation of the Montreal Protocol, as required by the project's Agreed Conditions.

National Execution Agency (AE)

The execution agency (AE based on its initials in Spanish) for the project is MINAE . Execution will occur under the national execution and direct payment request mode, in conformity with the procedures established by UNDP.

For the purposes of this project, a National Execution Agency shall be understood to be the organization in charge of general planning and management of the programme or project activities, presenting reports, accounting, supervising, and evaluating the programme or project, supervising implementation organizations, and managing and auditing UNDP resources used. MINAE must be accountable to the public authority in charge of coordination and to UNDP with regard to the products, attaining the programme or project objectives, and using UNDP resources.

- Name, upon signing this Project Document, the National Director in the administrative division that may be believed to be pertinent.
- Identify candidates qualified to assume the role of Project Coordinator, in accordance with the TORs and the attached qualifications, under UNDP's standard hiring procedures. MINAE will review and recommend the three final candidates to the CDN. The CDN will review the three final candidatures, select the best candidate and officially appoint the Coordinator during its first session. Once appointed, the Coordinator will be responsible for establishing the technical support team.
- Perform any actions necessary for complying with the specific objectives and activities established in the Project Document.

7.2 UNDP

UNDP will provide any administrative support and budgeting/financial follow-up necessary for executing the project activities.

UNDP will provide administrative and substantial support, in addition to budget follow-up needed to execute the project's activities as requested by MINAE. For UNDP this implies the following:

- Provide support to the financial and administrative activities of the project along with other UNDP Personnel
- Appoint a Programme Office as a substantive focal point for the project
- Process the payment requests received and issue respective cheques or bank transfers using the FIM and WINFOAS corporate systems.
- In accordance with the presented requests, elaborate the respective contracts and amendments.
- In accordance with the received payment requests, provide support and carry out the purchasing process in accordance with UNDP procedures.
- Maintain a file containing all accounting, finance and budget information, including photocopies of vouchers and their annexes to facilitate verification by Headquarters.
- At the end of the execution period, and if necessary, establish the final destination for equipment purchased by the project
- Ensure that an annual audit of the project is carried out, to be charged to the budget of the project.
- Present separate reports of the resources that MINAE will transfer for the execution of the project. Each transaction will be registered against the approved budget lines.
- Send photocopies of vouchers and annexes on a monthly basis to MINAE for filing and verification purposes. These vouchers are available for consultation the moment that MINAE officials request them.
- Participate in the CDN called to meeting by the AE.
- Contribute to oversight management of the project's implementation, as well as to the preparation of Annual Progress Reports for submission to the MLF.

Report Presentations

At the beginning of the next calendar year, MINAE will provide a complete list of the inventory purchased with funds from this project, in conformity with UNDP procedures.

MINAE, in coordination with the CDN, will transfer any equipment at the end of the project, indicating their destination, in conformity with UNDP procedures.

MINAE must sign a Combined Delivery Report (CDR) on a quarterly basis, as well as any substantive, regular, and mandatory budget modifications derived from managing the project, based on prior consultation among the parties and in conformity with UNDP procedures.

MINAE must notify UNDP and the CDN of the operational closure of the project.

The UNDP will send MINAE the last Combined Delivery Report and Obligatory Final Review for the project for its signature, so that the project may be declared to be financially closed.

Thereafter, the UNDP will return any financial resources to the Montreal Protocol that may not have been expended for the project, witnessed by approval in their records of the final review.

Evaluation and Auditing

The project will have a final evaluation that will review activity compliance and the scope and/or attainment of the objectives and results foreseen for the project. That evaluation will be carried out with the participation of the UNDP, the CT, the CDN, and MINAE according to UNDP procedures.

The UNDP will perform annual audits of the project, in conformity with the procedures established for Auditing National Execution Projects, to be charged to the project. The report will be sent to the CT, the CDN, the AE, and the UNDP Auditing Office in New York.

MINAE, may perform project audits during its operational life of the project according to UNDP procedures.

Project Termination

Once a project has completed all its activities and any expected products and results have been obtained, it will be brought to a close.

The project is **operationally closed** when it has completed all its operational activities and when the following conditions have been met:

- When all the activities that had been planned for the project have been satisfactorily carried out, the phase-out target for MeBr have been met (as per the Agreed Conditions) in a sustainable fashion, and the expected products and results have been fully obtained and incorporated into MINAE ;
- The last consultant has finished his/her contract and turned in his/her final report;
- The project's administrative staff has finished its contract;
- The last company has finished and complied with its contract;
- The last equipment has been satisfactorily received by MINAE (the parties must have agreed in advance on the disposition or transfer of the durable goods acquired during the course of the project to the national authorities).
- The last mandatory review prior to the final review has been signed.

The project will be **financially closed** when:

- It is operationally closed;
- At least one audit has been carried out during the life of the project by the UNDP.
- The last mandatory review of the budget has been done the year following the project having been declared operationally closed, and when it has been duly signed by the competent authorities;

- MINAE has reported all its transactions to the UNDP;
- The UNDP has closed the project's accounts;
- The Resident Representative of the UNDP has signed the project's final budget review.

Support Services provided by UNDP Costa Rica

As solicited by MINAE, UNDP will provide the following support services for implementation activities, in accordance with UNDP regulations, norms, policies and procedures:

- Identifying and assisting in the recruitment of personnel for the project
- Acquiring goods and services
- Facilitating capacity-building activities
- Issuing of contracts and payments for experts, international consultants, as well as reimbursements for travel allowance when necessary.
- Issuing of contracts and payments for administrative staff.
- Issuing of travel allowance for domestic travel.
- Issuing of contracts and payment for national consultants.
- Issuing of contracts and payment for companies.
- Issuing of payments in various capacity-building activities.
- Issuing of purchase order and payments in relation to equipment purchase.
- Issuing of miscellaneous and administrative expenses.

The service necessities for project support, indicated in the previous paragraph can be revised following a mutual agreement between the UNDP Resident Representative and MINAE.

The Basic Agreement rules and regulations, including responsibilities, immunities and privileges, apply to the services detailed in the previous 2 paragraphs. The general responsibilities of the Project's execution rest on the Costa Rican Government, on the executing agency that the Government has appointed. UNDP's responsibility is limited to the supporting services detailed in this Project document.

If complaints or controversies with regards to the lending of support services by UNDP arise, they will be resolved under the corresponding regulations of the Basic Agreement., published by Law ·5878 on January 31st of 1976.

UNDP Costa Rica will present financial and budget reports that reflect the support services provided as well as reports pertaining to reimbursed expenses in providing these services as deemed necessary. With this purpose, UNDP will provide MINAE with access to an internet based information system (IT-ToolKit) allowing for detailed transactions related to this project and registered in UNDP's financial system (committed and disbursements), depending on the budget line and the availability of funds.

The estimated service support costs for carrying out these activities is 3% of the total amount of the project, which were calculated specifically for the current operation and using as a base the impact that the project will have on the current level of operation of the Representation. Any new request within the programme shall be analyzed as

such, and therefore, new support costs will have to be calculated in accordance with the solicited requirements. This amount will be transferred directly to UNDP, not deducted from the total amount of the project.

7.3 **Legal Context**

The legal context for a project in the national execution mode is described as coming from the Basic Agreement between the Government of the Republic of Costa Rica and the UNDP signed by both parties on August 7, 1973, and approved by Law No. 5878 published in the La Gaceta official publication on January 31, 1976. For the purposes of the Basic Assistance Agreement, it will be understand that the national execution organization will be the Ministry of the Environment and Energy (MINAE based on its initials in Spanish).

The following types of reviews for this document may be made with the signature of the Resident Representative of the UNDP, so long as the Representative has *the security of knowing that the other signatories to the document have no objections to the proposed changes*:

- Reviews of any of the document appendices or any additions.
- Budget reviews that do not imply significant changes to the immediate objectives, the results, or the activities, but which are due to a redistribution of already stipulated supplies or increases in expenses due to inflation.

Any mandatory annual reviews used to reflect the real expenses for the last year and phasing out of the stipulated supply expense to subsequent years may only be done with the signature of the Resident Representative of the UNDP.

The signatories accept hiring within the country of any professional staff that may be necessary to execute this programme in conformity with the policies and procedures of the UNDP established to that end. These services constitute an addition to the ordinary staffing resources that the national institutions will provide; they will be available so long as UNDP participation in the programme may last.

Staff selection and salaries will be set in each case by mutual agreement and in no case may the salary exceed the remuneration prevalent for comparable functions within the country, nor may it exceed any applicable remuneration within the United Nations System.

ANNEX 8: Agreed Conditions for Phase-Out of Methyl Bromide in Costa Rica

Multilateral Fund Executive Committee, December 2001

1. The Executive Committee agrees to approve, in principle, US$4,845,283 as the total funds that will be available to achieve the phase-out of methyl bromide (MB) used for all purposes in Costa Rica, excluding quarantine and pre-shipment applications, subject to the following understanding and considerations.

2. As reported to the Ozone Secretariat, and consistent with information in the project document presented to the Executive Committee, the MB baseline for compliance for Costa Rica is 342.5 ODP tonnes (1995-1998) and the average MB consumption for the years 1998-2000 is 426.9 ODP tonnes, excluding quarantine and pre-shipment applications. Accordingly, Costa Rica must reduce its consumption of MB to 342.5 ODP tons to achieve compliance with the Montreal Protocol's 2002 freeze obligation, and to no more than 274 ODP tonnes in 2005 to achieve compliance with the Protocol 20 per cent reduction.

2. Reductions in accordance with the terms of this project will ensure that Costa Rica will meet the reduction schedule listed below. In that regard Costa Rica commits, through the implementation of this project, to reduce total national consumption of controlled uses of MB to no more than the following levels of consumption in the years listed below:

2002	342.5 ODP tonnes (reduction of 84.4 ODP tonnes from 426.9 ODP tonnes)
2004	253.5 ODP tonnes (reduction of additional 89.0 ODP tonnes)
2006	169.9 ODP tonnes (reduction of additional 83.60 ODP tonnes
2008	0 ODP tonnes (reduction of additional 169.9 ODP tonnes)

4. The project will phase out all uses of MB in Costa Rica, excluding quarantine and pre-shipment and other essential uses. Costa Rica will not request any further assistance from the Multilateral Fund projects for the non-QPS MB sector in order to achieve this phase-out. The phase-out will be permanently sustained through the use of import restrictions and other policies deemed necessary. UNDP shall report back annually to the Executive Committee on the progress achieved in meeting the reductions required in the project.

5. Following an initial disbursement of 25 per cent of the funds, funding for later years will be disbursed by UNDP in accordance with the following schedule and with the understanding that a subsequent year's funding will not be disbursed until the Executive Committee has favorably reviewed the prior year's progress report:

2002	20 per cent of the funds
2003	20 per cent of the funds
2004	20 per cent of the funds
2006	15 per cent of the funds

6. The Government of Costa Rica has reviewed the consumption data identified in this project and is confident that it is correct. Accordingly, the Government is entering into the agreement with the Executive Committee on the understanding that, should additional MB consumption be identified at a later date, the responsibility to ensure its phase-out will lie solely with the Government.

7. The Government of Costa Rica will have the flexibility in organizing and implementing the project components which it deems more important in order to meet its phase out commitment noted above. UNDP agrees to manage the funding for this project in a manner designed to ensure the achievement of the specific MB reductions agreed for the sector.

ANNEX 9: Agreed Work Programme, Phase I:

1. Objectives

Upon signing the project document, the following Work Programme (Phase I) to aid Costa Rica in voluntarily substituting methyl bromide (MeBr) use was agreed to, with the purpose of accomplishing a step-wise decrease in MeBr imports.

The Phase I work programme has the following objectives.

1.1 Provide technical assistance to MEBR users who voluntarily wish and are prepared to incorporate alternatives at this time, both in the cut flower and melon production sectors.
1.2 Provide alternative agricultural equipment and materials to the properties participating in the training/technology transfer programme during Phase I. The alternatives will be transferred and adapted to satisfy the particular needs of the properties, to the degree necessary for them to become cost effective.
1.3 Carry out independent financial evaluations about the practical and economic viability of the alternative costs and their effects on competitiveness, to be reviewed by governmental departments, producers, and other stakeholders.

2 Technical Activities

2.1 Producer Participation

The flower and melon producer associations are key partners in terms of ensuring this programme's success and sustainability. The presidents of these associations or any representatives named by them, will be part of the National Steering Committee (CDN based on its initials in Spanish) (see section 2.1). They may also name one or more technical staff members to the Technical Committee (CT based on its initials in Spanish) (see section 3.2). The programme terms provide for implementation flexibility. The producers may voluntarily participate in the programme. Others may prefer to abstain temporarily in order to evaluate the results. The points of view of all producers with regard to any of the proposed programme issues will be welcome at any stage.

2.2 Technical Teams

Once the initial group of producers wanting to incorporate MeBr alternatives has been identified, small groups of specialized agriculturalists will carry out programme activities with the interested producers. A team will provide support to the cut flower sector and another team to the melon producer sector. Each group will be coordinated by the pertinent technical staff experienced in Phytosanitary Management, who in close communication with the project coordinator, will receive periodic updates about technical supplies. Establishing teams by sector is envisioned as follows:

2.2.1 Flower Sector Team:

- Staff from Phytosanitary Management specializing in helping the Flower Sector;
- Producers participating in the programme and their technical staff;

- Experienced experts and technical staff knowledgeable about controlling soil pests and flower diseases; and,
- Experienced experts and technical staff knowledgeable about alternatives for the sector (for example, cost-effective substrata systems, modern boiler systems, etc.).

2.2.2 Melon Sector Team:

- Staff from Phytosanitary Management specialized in helping the Melon Producer Sector;
- Producers participating in the programme and their technical staff;
- Experienced experts and technical staff knowledgeable about controlling soil pests and diseases affecting melon producers;
- Experienced experts and technical staff knowledgeable about alternatives for the sector.

Both of the project's technical execution teams (cut flowers and melons) will provide updates and regular reports to the Technical Committee (CT based on its initials in Spanish) (see section 3.2) via the Project Coordinator. These reports must conform to the meeting schedule established for the Technical Committee.

2.3 Access to Assistance

Initially, each producer participating in Phase I of the Work Programme will be visited by experienced experts/technical staff in order to discuss the MeBr alternatives available with them and their technical administrators. Alternatives will be presented that have proven to be effective, as well as any alternatives that are in use in other countries with similar pests, climates, and conditions. The experiences of Costa Rican producers who may not use MEBR will also be presented and explored so they may provide additional options for some regions.

Each participating producer will discuss the options with the experts. Together they will determine the best technical treatment and will make a list of needed equipment and agricultural materials. The equipment and material costs will be annotated in detail. The programme will cover the incremental investment costs (for example, costs in addition to the sum that the producer may have spent on MeBr), sharing the programme funds available among the different properties. For example, the programme could give each participating property sufficient equipment/materials for installed alternatives based on a specific number of hectares. When the programme begins, notes should be taken for each property participating in the work plan about the budget and the activity timeline, to be discussed in full with the producer/technical administrator and evaluated by the producer and the project team.

The Programme will provide the stipulated materials and agricultural equipment; this administrative procedure will receive assistance from the local UNDP office in San Jose. The support services received from the local office will be financed by UNDP funds coming from outside the programme budget.

2.4 Access to Training

At the same time, training will be held for the programme trainers. The regional and international experts in MeBr alternatives will train the staff of the two project teams (cut flowers and melon producers).

The project teams in turn will provide technical assistance to all the participating producers to ensure installation, adaptation, and if necessary, improvement in the equipment required for effectively adopting the alternatives. Training will be provided on site to all relevant personnel so that the equipment and materials for the alternative may be efficiently used and maintained. Technical manuals for the alternatives introduced by the programme will be produced. Technical assistance and support by specialists will continue to be provided throughout the lifetime of the programme.

2.5 Results Monitoring

The efficiency, yield, and costs of alternatives will be monitored by agricultural experts at the selected sites, and reports will be drafted highlighting the programme results. The financial information will be audited independently. Additional regional financial data must be collected to provide information about the impact on competition. Field tours will be organized so that the relevant stakeholders may see the results of the activities at the site.

Additional efforts may be made to examine the feasibility of innovative and promising alternatives, if the participating producers feel that doing so would be of interest. In addition, and in an effort to generate local economic benefits, research may be done on the viability of introducing materials produced at the local level that may be less costly (for example, better and less expensive substrata materials for the cut flower sector).

2.6 Selection of Alternatives

The selection of alternatives will vary depending on the type of harvest, the type of producer, the type of soil, local weather, and harvest conditions. Any options referring to viable alternatives will be discussed in advance with each producer participating in the programme, so they may choose the most appropriate techniques, given their specific circumstances. The strategy will be guided by factors that are important to the producers and any foreseen market pressures with regard to MeBr such as:

- Alternative effectiveness in controlling target pests;
- Cost-effectiveness, especially with regard to competition in neighboring countries;
- Adequateness at the technical level for the different types of properties;
- Meeting market requirements in terms of quality, yield, fruit size, and harvest time;
- Ability to comply with future market pressure in terms of eliminating MeBr; and,
- Sustainable and environmentally sound techniques to be adopted in the longer term.

2.6.1 Cut Flower Sector

The most effective alternatives identified for the greenhouse cut flower sector, currently in use in other countries, are modern (efficient) steam systems and substrata (soil-less) systems based on inexpensive local substrata materials.

- Steam systems based on negative pressure can apply steam uniformly to the soil, to any depth desired; these are much more effective in terms of

costs than the traditional steam methods. They also may be used on a range of soils that is much broader than for traditional steam techniques.

- For substrata, initially it will be necessary to import the substrata materials needed for the first year, while local tests are run simultaneously to determine the absence of diseases and waste materials (how they are used in other countries) in order to identify the least expensive substrata materials available locally in Costa Rica.

Other alternatives for cut flowers will be fully considered and discussed with each participating property, so that the property owner may make the decision about what is most appropriate for his/her property.

2.6.2 Melon Sector

- An alternative that has proven to be very effective is metam sodium, injected using modern rototilling-plowing equipment that distributes the metam sodium uniformly in the soil, reaching the depth required and providing good control for fungi, nematodes, and weeds. Depending on the range of pest species at each place, a combination using an additional treatment may be necessary. A rototiller-plowing machine may provide fumigation services to several properties. In some cases a combination of Telone (1,3-D + chloropicrin) + herbicides may be very effective.
- Grafted melon plants are increasingly being used in southern Europe for controlling soil diseases such as *Fusarium* and *Verticillium* and nematodes such as *Meloidogyne*. Grafted plants can be effective against Melon Necrotic Spot Virus (MNSV) transmitted by the *Olpidium bornovalus* soil fungus and the death of climbing plants related to the fungus *Monostporascus canonballus*. Depending on the pests present, grafted plants may need to be combined with other treatments. In the past, grafting was not considered to be economical, but operating costs have improved a great deal to date. The Programme can provide assistance with the capital costs for producing grafted plants in greenhouses, making it an economically viable option. For small properties, greenhouse production may be assumed by a group of properties (collective production).

Other options for cultivating melons will be considered and discussed in depth with each participating property so that the owner of the property may make a decision at his/her convenience about what is appropriate for his/her property.

4. Programme Budget

The funds available for implementation of the First Phase of the Work Programme are $1,211,321. Of the US $1,211,321, it is expected that approximately US $277,000 will be allocated to provide technical assistance and related work and approximately US $73,000 to controlling pests, laboratory analyses, technical and financial consulting, and discussing results with stakeholders. The remainder, almost US $860,000, will be allocated to supplying agricultural equipment and materials for installing the alternatives on the properties during Phase I. An exact and precise break-down will be determined after the participating producers have been identified and after a discussion of the preferred alternatives with experts and the project teams has been conducted.

Provided that the freeze target of 342.5 ODP tons for 2002 has been achieved, and the project's implementation is launched well within 2003, additional funds may be requested during 2003, as per the overall project's Agreed Conditions. Should this be possible, an additional US $969,057 would be available over the course of the year and into 2004 to allow additional MB users to participate in the programme if they wish, thereby consolidating the freeze and assisting Costa Rica to move towards the 20% reduction in MB consumption required by the Montreal Protocol in 2005.

A draft budget breakdown is shown in Appendix 2.

APPENDIX 1
Timeline and Main Points for Proposed Phase I.

Month	1-2	3-4	5-6	7-8	9-10	11-12
Project Document Signed	■					
Steering and Technical Committees Established	■					
Steering Committee Meeting Held		■				
Technical Committee Meeting Held	■	■	■	■	■	■
Project Coordinators Identified and Named	■					
Producers Interested in Participating in Phase I of the Programme Identified	■					
The Programme Team and Experts Visit the Properties	■	■				
Equipment and Materials Supplied	■	■	■			
Trainer Training Sessions Held		■	■			
Technical Assistance at Properties			■	■	■	■
First Equipment Group Delivered and Installed		■	■			
2nd Equipment Group Installed			■	■		
3rd Equipment Group Installed				■	■	
Monitoring and Technical and Financial Assistance			■	■	■	■
Stakeholder Review and Assessment			■	■	■	■

APPENDIX 2
Budget Proposal for Phase I of the Work Programme

A precise break-down of the budget can only be determined after the producers participating in Phase I of the implementation and the experts have come to an agreement about the preferred alternatives and after developing the work plan needed for each property. The project terms provide for flexibility in implementing and allocating funds as needed to comply with the limits of the Montreal Protocol.

Item	Estimated Budget (US$)
Technical Assistance (Technology Transfer): Includes experienced experts in agriculture and technical staff; visits to properties to discuss alternatives, installing alternatives, adapting the alternatives and technical support, & producing manuals and technical publications	277,000
Sub-Total for Technical Assistance	**277,000**
Monitoring Technical Results: experts in soil diseases, nematodes, and weeds, monitoring pests, and laboratory analyses.	43,000
Collecting and evaluating economic data, including reviews by independent experts of the economic data.	15,000
Meetings/workshops to discuss project results with stakeholders.	10,000
Field days	5,000
Sub-Total for Monitoring and Discussion with Stakeholders	**73,000**
Agricultural Equipment and Materials: NB. The list will depend on discussions with participating producers and experts. Some examples for illustrative purposes are:	
Efficient boiler equipment	60,000
Inexpensive substrata equipment	200,000
Rototiller-plowing equipment	30,000
Greenhouse system for grafted plants	134,000
Other agricultural materials to be determined	437,321
Sub-Total for Equipment and Materials	**861,321**
Total for Phase I of the Programme	**1,211,321**