

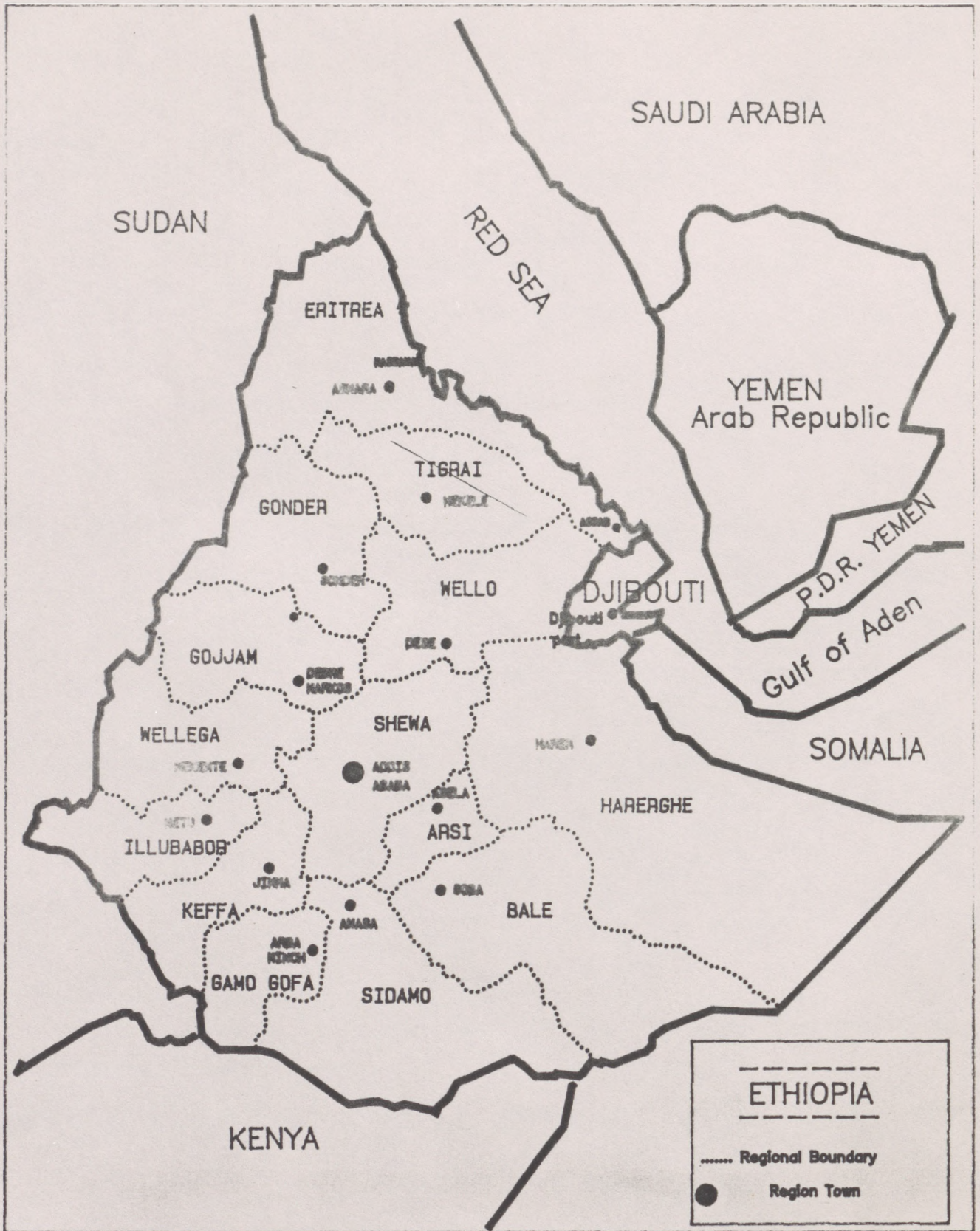
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ETHIOPIA:  
1988 RELIEF OPERATIONS

UN Emergency Prevention and Preparedness Group, Addis Ababa  
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## RELIEF AND REHABILITATION COMMISSION

In response to recurring drought and famine, the Relief and Rehabilitation Commission (RRC) was established by the Government of Ethiopia in 1974.

The main functions of the RRC are as follows:

To coordinate relief activities and distribute relief aid to affected people in the event of disaster; identify and implement development schemes that will rehabilitate disaster-affected people; take the necessary measures to prevent possible disaster or minimize its consequences; relocate settlers in settlement areas and assist them to organize themselves into various cooperatives.

Currently, the RRC is coordinating the activities of more than 50 non-governmental organizations (NGOs) involved in relief, rehabilitation and development programmes in Ethiopia.

The RRC has offices in 15 of 16 regions of Ethiopia.

Apart from regular telephone links, communication with the head office is maintained daily through a wide network of radios located at regional, awraja and worreda levels.

The RRC also operates the largest relief trucking operation in Ethiopia, and maintains and operates its own small fleet of aircraft.

In addition to providing emergency relief supplies and shelter, the RRC also has the mandate to rehabilitate drought-affected people through the distribution of seeds, tools, replacement of oxen, household utensils, cash subsidies and food grants; establishment and management of orphanages and children's villages to take care of the thousands of children left homeless and without parents by disasters; and land reclamation and resettlement projects. Since the settlement programme began in 1984, 610,000 people have been assisted to be resettled - 10,300 of them since November 1987.

In 1976, the RRC established an Early Warning System. It is considered by experts to be one of the most accurate of its kind in the developing world. The Early Warning System uses a combination of crop production assessments, market factors, meteorological forecasts and nutritional surveillance to predict the condition of grain supply and demand. These findings are then used by the RRC to alert donors of impending food shortages and to develop programmes to minimize the affect of these shortages.

## OPERATIONAL PARTNERS

- In addition to the RRC which is responsible for coordinating all relief activities, the UN agencies and the League of the Red Cross (LRCS)/Ethiopian Red Cross Society (ERCS), around 64 NGOs are operating in Ethiopia. Some 50 are involved in the current emergency relief effort.
- While the RRC is spread countrywide, major agencies assisting in the distribution of food and other emergency items in Eritrea and Tigray include the Joint Relief Partnership (JRP) which comprises the Ethiopian Catholic Secretariat, the Ethiopian Evangelical Church Mekane Yesus, Catholic Relief Services, the Lutheran World Federation and the Ethiopian Orthodox Church.
- The JRP was created in 1984 as part of an ecumenical effort to coordinate a clearly defined famine intervention programme in Eritrea and Tigray. Members of the JRP maintain their own identity but work together under one umbrella, pooling resources to support the joint effort. Presently, the JRP also works in Hararghe, Wollo, Shewa, Keffa, Illubabor and Wellega. In addition to JRP, LRCS/ERCS are also operational in Tigray and Eritrea.
- Other major agencies are located as follows:
  - Wollo: Oxfam-UK, World Vision International (WVI), ERCS, Japan International Volunteers Center, Save the Children-UK (SCF-UK), Society of International Missionaries (SIM), Ethiopian Evangelical Church Mekane Yesus (EECMY), Ethiopian Orthodox Church (EOC).
  - Gondar: Food for the Hungry International (FHI), ERCS, Canadian Physicians for African Relief, Joint Distribution Committee.
  - Shewa: Save the Children Federation-US, WVI, ERCS, Baptist Mission of Ethiopia, FHI, Baptist General Conference Mission, Swedish Philadelphia Church Mission.
  - Sidamo: CARE, WVI, ERCS, Redd Barna, EOC, Norwegian Church Aid, SIM, CONCERN.
  - Bale: ERCS, Norwegian Church Aid.
  - Hararghe: CARE, World University Service of Canada, Hararghe Catholic Secretariat.

■ In 1987, when 3 million people were estimated to need food assistance in Ethiopia, NGOs distributed more than 14 million food rations throughout the 12 months. More than 300,000 MT of food was transported and handed out by NGOs and the RRC in the course of the year.

■ In 1986, approximately\* 836,000 MT of relief food was distributed to an average of 5.5 million people per month, one-third of this distributed by Red Cross Societies and NGOs.

\* This figure includes refugees and returnees.

## COORDINATING MECHANISMS

■ The Relief and Rehabilitation Commission: Responsible for national coordination and management of all relief programmes within Ethiopia. RRC holds regular meetings with bilateral donors and NGOs to inform them of the current situation and ongoing needs.

■ RRC Information Committee. This committee meets monthly to review the gathering and management of information necessary for disaster planning and prevention. It is made up of representatives from the RRC, the Office of the National Committee for Central Planning (ONCCP), UN Emergency Prevention and Preparedness Group (EPPG), the World Bank and the Christian Relief and Development Association (CRDA).

■ Informal Bilateral Donor Group. Organized originally in 1985, this group, made up of all donor country representatives in Ethiopia and representatives of CRDA (see below), meets monthly to discuss situation reports, food pledges and responses to Government of Ethiopia appeals.

■ Christian Relief and Development Association. Established in 1973, CRDA was formed to bring together churches, Christian groups and agencies involved in relief and development programmes. The aim is to share information, development techniques and resources. CRDA currently has 50 members, and it meets monthly.

■ Shipping Meeting. In order to facilitate efficient shipment of food and non-food items into Ethiopia, the World Food Programme (WFP) convenes a weekly shipping meeting to review shipment schedules. It is attended by bilateral donors and CRDA. The shipment schedules are planned to assist the Ministry of Transport in avoiding port congestion.

■ The Health Technical Committee: Meets monthly to deal with technical health matters related to drought and famine. Its membership includes the Ministry of Health, the RRC, the Family Guidance Association and various UN agencies and NGOs.

■ The UN Emergency Prevention and Preparedness Group (EPPG): Established on 1 January 1987 to replace the Office for Emergency Operations in Ethiopia (opened November 1984), EPPG is chaired by the Secretary General's Special Representative. Members include representatives from UNDP, WFP, UNICEF, FAO, WHO, UNDRO, UNHCR, the World Bank and other UN agencies actively involved in emergency relief, prevention and preparedness. Its role is to coordinate relief and rehabilitation efforts among the UN community and to support the RRC in its efforts to coordinate relief, prevention and preparedness activities. It meets bi-weekly.

## RELIEF FOOD REQUIREMENTS

■ In August 1987, the RRC gave its first early warning of impending food shortages in Ethiopia during 1988. The warning came following the widespread failure of the June/July 1987 rains. On 5 September 1987, the RRC quantified the crop shortfall at 950,000 MT, and on 13 November 1987 this figure was updated to 1.046 million MT for an estimated 5.2 million beneficiaries.

■ Worst hit regions were Eritrea where 1,049,500 people were estimated by the RRC to be affected; Tigray, 1,035,900; Wollo, 1,017,100; and Hararghe, 925,400.

■ Parts of northern Shewa and Gondar also experienced severe crop damage due to lack of rain. RRC assessment of need for these areas indicated that 511,000 people would need food assistance in Shewa; 292,400 in Gondar.

■ Other regional assessments: Sidamo, assistance for 320,000 people; Bale, 30,200; Gamo Goffa, 32,500.

## 1988 RELIEF PLEDGES\*

■	<u>Emergency Food Assistance:</u> Confirmed:	1,023,514 MT
■	<u>Agricultural Assistance:</u> Total:	US \$17,729,836
■	<u>Health Assistance:</u> Total:	US \$11,263,591
■	<u>Airlift Operation</u> (includes donations through EEC, CARITAS and the UN Emergency Transport Fund): Total:	US \$35,379,818
■	<u>Water/Sanitation Assistance:</u> Total:	US \$6,790,849
■	<u>Logistics:</u> Total:	US \$3,268,255
■	<u>Ports:</u> Total:	US \$5,345,551
■	<u>Relief/Shelters:</u> Total:	US \$5,785,155
■	<u>Road Transport:</u> Total:	US \$47,612,981
■	<u>Transport Subsidy:</u> Total:	US \$29,152,650
■	<u>Warehousing:</u> Total:	US \$7,579,401
■	<u>Other Assistance:</u> Total:	US \$20,413,536
■	<u>TOTAL NON-FOOD EMERGENCY ASSISTANCE:</u>	US \$190,311,627

\* These figures include all UN agencies and are updated as of 17 November 1988.

■ Food Aid Balance Sheet:

Carryover stock from 31-12-87	125,440 MT
1988 pledges arrived in 1987	48,990 MT
1987 pledges arrived in 1988	60,916 MT
1988 pledges arrived	851,576 MT
1988 pledges due to arrive	120,200 MT
TOTAL	1,207,122 MT

■ Unmet food aid needs (the total is based on the RRC request for 1.046 million MT plus 100,000 MT of relief aid recommended by WFP for 1988 carryover stocks):

Total uncovered cereal requirements	0 MT
Unmet supplementary food needs	3,200 MT

## LOGISTICAL INFRASTRUCTURE

Ethiopia is served by three ports: Assab and Massawa in the North, and Djibouti which supplies food and cargo by railroad, mainly for Hararghe Region.

Maximum anticipated discharge capacity of all cargo at the two Ethiopian ports is as follows:

Assab:	130,000 MT per month
Massawa:	50,000 MT per month

Daily offtake from ports during October 1988:

Assab:	food aid, daily average	1,622 MT
Massawa:	food aid, daily average	1,400 MT
Djibouti:	food aid, daily average	300 MT

Stock situation in ports as of November 11, 1988:

Assab:	food aid	168,684 MT
	commercial wheat	1,088 MT
	other cargo	104,387 MT
	<u>fertilizer</u>	<u>1,537 MT</u>
	TOTAL	275,695 MT

Massawa:	food aid	46,384 MT
	commercial wheat	119 MT
	<u>other</u>	<u>3,490 MT</u>
	TOTAL	49,993 MT

Djibouti:	food aid	22,218 MT
	<u>other</u>	<u>6,397 MT</u>
	TOTAL	28,615 MT

## LOGISTICAL REQUIREMENTS

- As part of prevention and preparedness efforts, a UN Multi-donor Relief Transport Mission was organized from August to October 1987 to study truck, air transport and port capacity within Ethiopia.
- The Mission, financed by the WFP, USAID, the Federal Republic of Germany and Band Aid, was conducted in close collaboration with the RRC and the Ministry of Transport.
- Field operations were undertaken by the Mission between 17 August and 5 October 1987. Its findings were timely in relation to the 1988 emergency, allowing steps to be taken to alleviate, and in some cases, solve potential bottlenecks in the food pipeline.
- The Mission Report, published in October 1987, identified the need for 300 additional trucks for Tigray and Eritrea. To meet this requirement, it was recommended that donor contributions be sought for 100 new longhaul trucks for the relief operations in Tigray and Eritrea, and that 200 should be moved from the south to the North.
- The Mission also recommended that spare parts for the RRC and the Ethiopian Freight Transport Corporation (EFTC) in the North be brought in at a cost of US \$2.5 million.
- Since the report was published, most of the recommendations for transport have been met. An additional 239\* longhaul and 80 short haul trucks have been pledged by donors; 173 trucks have been moved from the south to the North to assist with offtake from Massawa and the ferrying of food into the hinterland.
- The Swedish Government is undertaking a rehabilitation programme for 139 RRC Volvo trucks; the Italian Government has begun a US \$1.3 million rehabilitation programme for 124 Fiat trucks and trailers; the Federal Republic of Germany has agreed to rehabilitate 53 of the RRC's Mercedes trucks at a cost of US \$1.87 million; and Austria is providing US \$875,000 for spare parts and experts to overhaul 31 of the RRC's shorthaul trucks. The EEC, meanwhile, has pledged US \$3.25 million for spare parts for the RRC, World Vision, CRDA, Oxfam and ICRC.

- In addition, US \$320,617 worth of assistance to WTOE has been pledged by the Netherlands to provide a DAF recovery truck, spare parts and a containerized workshop. France has promised WTOE US \$52,000 for three mobile fuel stations. Also for WTOE, Switzerland has pledged US \$632,000 for spare parts, Land Cruisers and radios; the UK has pledged US \$37,500 for spare parts; and the US Government, US \$1.5 million for spare parts.
- On the ports, the Mission found that port and grain handling equipment in both Assab and Massawa urgently needed to be replaced or rehabilitated to meet relief food handling requirements.
- It also identified the need for 8 tractors, 7 grain dump trucks, 4 bagging machines, a stock of spare parts for portable cranes and other equipment. Total cost for improvements to the ports were estimated at approximately US \$1.6 million.
- The Netherlands has provided US \$1,587,551 for 4 bagging units, belt conveyors, vacuators and spare parts for Assab. It also has pledged US \$120,000 for spare parts for 6 portable cranes for Massawa and Assab. The UK has supplied 8 tractors as part of a US \$1.7 million package which includes grain dump trucks for Assab, tarpaulins and pallets. Italy has provided 4 cranes for Assab and has pledged US \$450,000 for trailers for Massawa.
- The Mission also concluded that there was an immediate need for light aircraft to be used to reach inaccessible areas, and that a special air transport fund be set up to pay for a wide variety of trucking and associated requirements including an airlift operation, should it become necessary.
- A UN Emergency Transport Fund was duly created under the auspices of UNDRO in October 1987 (see Air Operations).

\* Includes 40 longhaul trucks for UNHCR.

## WFP TRANSPORT OPERATION IN ETHIOPIA (WTOE)

The World Food Programme Transport Operation in Ethiopia (WTOE) began operations in November 1985 to help solve bottlenecks in the movement of food and other emergency relief supplies from the ports to the 7 million people then affected by drought and famine.

WTOE began with 250 longhaul trucks, 150 donated by USAID and 100 by Band Aid. WTOE became the largest UN fleet in existence, although in Ethiopia itself, the RRC fleet is still the major mover of relief food and other supplies.

Since November 1985, WTOE has moved over 750,000 MT of vital relief supplies to all parts of Ethiopia, supplying food and other emergency supplies for both relief efforts and for refugees in eastern and western Ethiopia.

To replace trucks lost in the October 1987 attack on a UN food convoy and others written off in mine and other accidents, 106 new trucks have been pledged by donors to WTOE. One hundred and one of these new trucks had arrived in Ethiopia by October 1988. In addition, 14 of ICRC's longhaul trucks in the North were given to WTOE on loan at the beginning of July 1988.

WTOE was established as a non-profit organization. Since its creation, most of its customers have been non-governmental organizations, although the fleet also transports relief supplies for the RRC, Food-for-work for the Ministry of Agriculture and the UNHCR.

Currently, while management rests with WFP, overall WTOE policy is entrusted to a committee chaired by the Chief Commissioner of the RRC. Ministry of Transport, WFP, CRDA, Band Aid and USAID are represented on the committee.

WTOE headquarters are in Addis Ababa. For the southern operation, WTOE has bases at Assab and Kombolcha. In order to assist UNHCR to transport food to the large influx of Sudanese refugees coming into western Ethiopia, WTOE has closed its base at Dire Dawa and transferred it to Nekemte in Wollega Region. WTOE's northern operation is based in Asmara.

WTOE has maintenance facilities, spare parts and tyre depots in Assab, Kombolcha and Asmara. The WTOE fleet presently consists of 316 trucks, two prime movers and two mobile workshops.

WTOE has an extensive network of high-frequency radios, maintaining one at each WTOE base and at headquarters. In addition, WTOE has 12 mobile radios used by patrol officers. The mobile workshops are also equipped with radios.

Between September 1987 and the end of October 1988, WTOE moved nearly 400,000 MT of relief food in Ethiopia. This included:

September	14,650 MT	May	29,050 MT
October	15,600 MT	June	32,500 MT
November	11,539 MT	July	39,000 MT
December	24,266 MT	August	27,593 MT
January	26,932 MT	September	38,000 MT
February	23,000 MT	October	41,670 MT
March	24,516 MT		
April	27,067 MT		

In Tigray, where it was estimated that 12,500 MT of relief food should be moved by road to meet the needs of approximately 1.5 million beneficiaries, the following tonnage has been transported by WTOE since November:

November	4,904 MT	May	0 MT
December	5,277 MT	June	0 MT
January	3,581 MT	July	0 MT
February	4,000 MT	August	0 MT
March	7,889 MT	September	617 MT
April	0 MT	October	800 MT

In Eritrea the following relief food has been transported by WTOE:

November	358 MT	May	15,545 MT
December	970 MT	June	20,000 MT
January	6,000 MT	July	26,000 MT
February	7,346 MT	August	17,884 MT
March	3,376 MT	September	24,033 MT
April	10,219 MT	October	21,500 MT

## AIR OPERATIONS

- By November-December 1987, it was clear that the need for a large-scale airlift operation in Tigray and Eritrea was urgent following the near total crop failure in the region and the inability of the road pipeline to deliver sufficient relief food.
- Just prior to the start of the airlift at the end of November/December 1987, there remained only a 10-day stock of relief food in Mekelle for distribution to those in need in the area.
- To cope with the growing emergency, the UN Emergency Transport Fund, set up in Geneva in October 1987 under UNDRO auspices, chartered its first Hercules C-130 transport plane from U.S. based Southern Air Transport (SAT). This plane began operations in December 1987.
- A second UNDRO Hercules, chartered from the Belgian Air Force, joined the SAT plane in January 1988, ferrying food from Asmara to Mekelle, and from Massawa to Mekelle. Occasional trips were also made to Axum and from Assab.
- EEC agreed to participate in the airlift from its inception by helping CARITAS fund the chartering of two Hercules C-130 aircraft for the Joint Relief Partnership; and ICRC, also with EEC funding, initially operated the fifth Hercules.
- By March 1988, the following aircraft were involved in air operations:
  - 1 UNDRO-chartered SAT Hercules C-130
  - 2 Belgian Air Force C-130s (withdrawn on April 3)
  - 1 Swedish Air Force Hercules, flying for ICRC (flew between March 7 and March 24 only)
  - 1 EEC/CARITAS-chartered SAT Hercules C-130
  - 3 Soviet Antonov-12s
- In April and May, the number of Hercules involved in the airlift was reduced to three, but increased to five in June with the arrival of two Canadian Air Force Hercules, financed by CIDA and the UN Emergency Transport Fund. By late June, however, due to budget restrictions, the UNDRO-chartered SAT Hercules was released, and it left Ethiopia in early July, bringing the total number of Hercules involved in air operations during July down to four. These same four Hercules flew during August.

■ During September, the airlift operation was again reduced when two Canadian planes left the country. In their place, a SAT Hercules was chartered by UNDRO. This plane and the two EEC/CARITAS-financed Hercules continued to fly through September and October.

■ In addition to carrying relief cargo to the North, the UN Hercules also ferried emergency supplies for Somali refugees in eastern Ethiopia. Operations by the UNDRO-chartered Hercules were finally terminated at the end of October 1988. EEC/CARITAS currently have one SAT Hercules and one Ethiopian Airlines Hercules in operation.

■ As well as the heavy aircraft in Ethiopia prior to April 1988, 10 short takeoff and landing aircraft (STOL) were involved in relief operations. These aircraft were partially financed by the UN Transport Fund.

■ Following a Government decision in April to suspend light aircraft operations, this number was eventually reduced to 5 Antonov-2 aircraft provided by Poland and 2 Air Serv twin otters operating in northern Shewa and Gondar. These planes are engaged in moving relief supplies over short distances to inaccessible areas severely affected by drought.

■ Between December 1987 and the end of October 1988, the combined efforts of all Hercules and light aircraft flying in the airlift operation have moved more than 84,000 MT of food and relief supplies. Aircraft are transporting food and other cargo for JRP, WFP/MOA and RRC and UNHCR.

■ Donations to the airlift operation since it began have been received from the governments of Australia, Austria, BandAid, Canada, Cyprus, Denmark, the Federal Republic of Germany, Finland, France, Ireland, Italy, the Netherlands, Sweden, Switzerland, and the United Kingdom. In addition, Belgium, Poland and the United States have contributed through the provision of light aircraft or subsidies toward the aircraft operation. By October 1988, total donations to the UN Emergency Fund stood at approximately US \$15 million.

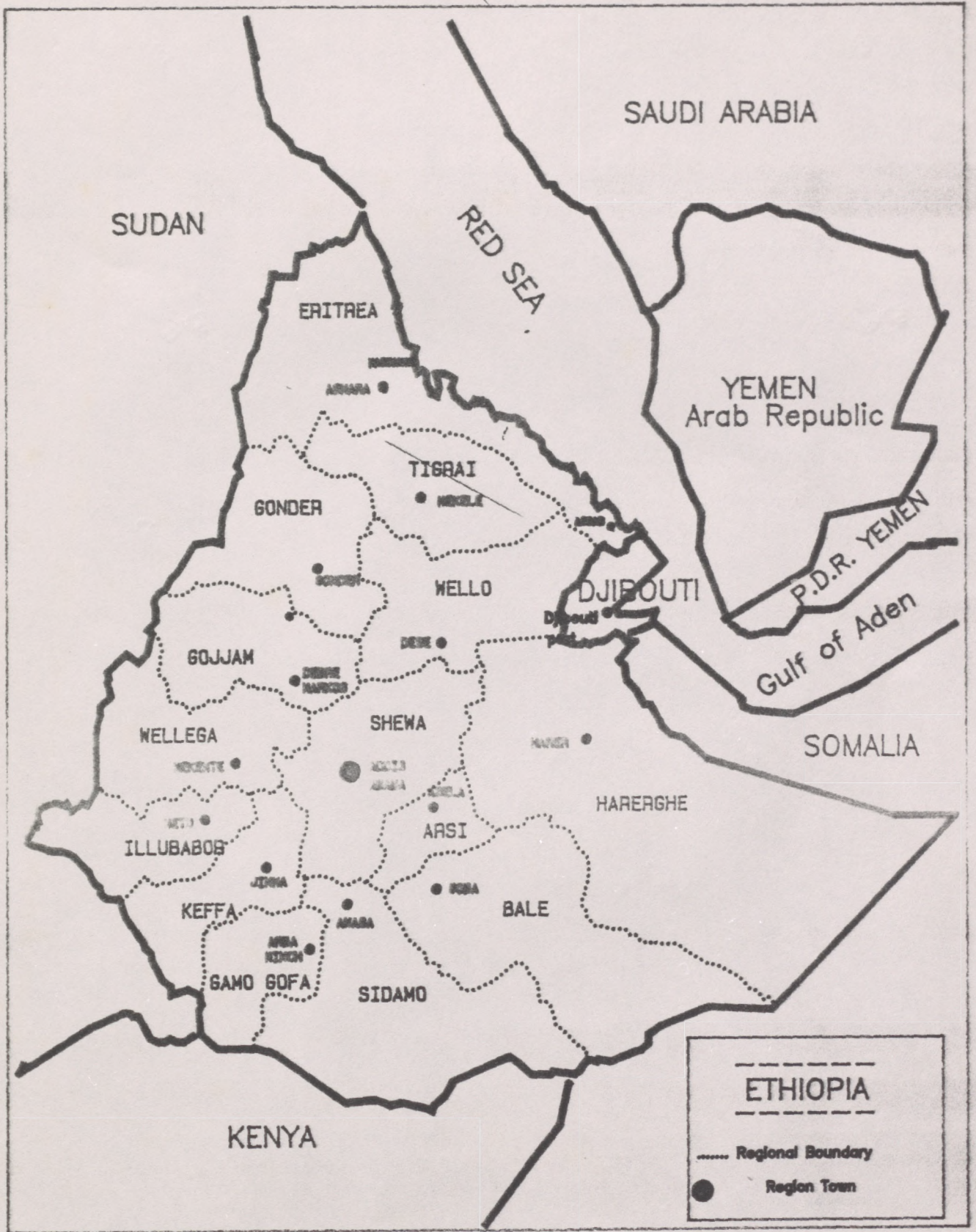
## STORAGE/WAREHOUSING

- Total countrywide warehouse capacity, estimated in a recent study, is around 1.4 million MT.
- Main warehouses are located at Assab; Massawa; Shashamane, Addis Ababa and Nazareth in Shewa Region; Kombolcha in Wollo Region; and Asmara in Eritrea.
- Pledges of more than 160,000 MT of emergency warehousing to store food closer to distribution sites for the relief effort were made during 1988.
- The Soviet Government has pledged 200 tents of 500 MT capacity each. The Government of Norway, through WFP, has donated 6,000 MT of tent capacity. Switzerland, 14,500 MT of prefabricated warehouses and tents; Australia has financed local construction of 2,500 MT of warehouse space in Tigray; the EEC has pledged a total of 38,500 MT of warehousing space, including local construction, prefabricated and tent warehouses. Japan pledged 10 tent warehouses to the RRC.
- In addition, more than 6,500 MT of warehousing (mostly Rubb Hall tents) has been donated for the Somali refugee programme in eastern Ethiopia.

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**ETHIOPIA:  
Famine Fact Sheets**

UN Emergency Prevention and Preparedness Group, Addis Ababa  
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## HISTORICAL FACT SHEET

- Recorded famine in Ethiopia dates from the 10th century.
- In the past 250 years, there has been, on average, a major famine every 11 years.
- Since 1957, local famines have been recorded every year. Sometimes they develop into regional disasters, especially in northern Ethiopia. Wollo and Tigray suffered famine in 1953; Tigray in 1958; Wollo again in 1966 and 1973. The famine of 1984-86 was exceptional in that it covered most of Ethiopia.
- Famine usually is triggered by drought, and it often is exacerbated by pests; always by poverty.
- The 1888 famine, in which one-third of the population of Ethiopia is said to have died, was caused largely by cattle deaths due to rinderpest.
- In Ethiopia, historical isolation, feudalism, internal and external strife have combined to produce grinding rural poverty (see section on Poverty).
- An increasing population (present growth rate is 2.9%) has put pressure on land, accelerating soil degradation and desertification. It also has led to a declining per capita consumption of grain and an ever-increasing frequency of famine.
- In 1984, 6 million people were in need of relief. In 1985, the figure reached a peak of 10 million. In 1986, it declined to 7 million; and in 1987 to 3 million following a harvest that was only slightly below normal.
- Food shortages in Ethiopia, with the attendant threat of famine, have to be seen now as a chronic condition; it can no longer be considered a cyclical phenomenon.

## CLIMATE AND LAND DEGRADATION IN THE ETHIOPIAN HIGHLANDS

- Ethiopia suffers from erratic, unpredictable rainfall. It has monsoonal rains in mountainous regions, and frequent thunderstorms with accompanying hail.
- Ethiopia has extremely rugged terrain that results in both heavy soil erosion and poor communications. Road density, both on a per capita and a square kilometer basis, is amongst the lowest in the world. These factors inhibit the free growth of rural markets.
- The physical resource base of Ethiopia today is severely degraded, as described in a 1985 FAO/World Bank Highland Reclamation Study:

"The highlands cover 270,000 square kilometers or about one-fifth of the country (total area: 1.222 million square kilometers) and contain:

88% of the 46 million population,  
two-thirds of 70 million livestock population,  
95% of regularly cropped land,  
90% of country's economic activity.

Over half of the highlands is significantly eroded; 20,000 square kilometers so seriously that it cannot sustain cropping. An average of 70 tons of soil per hectare is lost every year, rising to 100 tons per hectare for cultivated land. Today's children will see one-third of the highlands incapable of sustaining cropping while the population trebles in their lifetime."

- Nearly half of the country's land falls into the slope category of 35% and more. It is estimated that more than 52% of the area of the country is affected by soil erosion, causing a loss of about 2 billion cubic meters to the whole country in a year. High priority should be given to natural conservation and erosion control and to natural rehabilitation.
- The national forest cover is down from 40% at the turn of the century to 14% in 1950 to 4% today. Ethiopia's forests are decreasing by a net 200,000 hectares per annum despite a vigorous reforestation programme.

## ECONOMIC FACTS

- Sixty percent of the population of Ethiopia live below the absolute poverty level
- Fifty-one percent of the population is of working age; 85% of the labor force is engaged in agriculture
- Agriculture generates 90% of export earnings
- Coffee is the most important cash and export crop generating 60% of export earnings
- Energy consumption per capita (17 kilograms oil equivalent) is one of the lowest in the world
- The foreign exchange reserve allows for 1.1 months of import coverage
- External public debt represents 29.5 percent of GNP
- Official development assistance amounts to US \$15 (in terms of net disbursement) per capita
- The current account deficit represents 8.8% of GDP
- Ethiopia has 14,000 kilometers of all-weather roads of which only 28% are asphalt

## POVERTY

The grinding nature of Ethiopian poverty is illustrated by:

- Per capita GNP of US \$120 compared with US \$210 for low-income sub-Saharan Africa (SSA)
- Life expectancy of 46 years compared to an SSA average of 48.2
- Infant mortality of 168 per thousand compared to 128 for SSA
- A total of 88,100 people per physician (39,000 for SSA)
- Safe water for only 15% of the population (25.5% for SSA)
- A primary school enrollment of 37.1% (60.1% for SSA)

(Statistics from World Bank reports.)

The physical and historical isolation in Ethiopia has contributed to:

- An extremely low level of agricultural technology in which only:
  - 2% of peasants use improved seeds
  - 7% use fertilizer
  - Pesticides are rarely available to peasant farmers
- Slow growth of the rural market economy (nearly three-quarters of Ethiopia's farms are more than half a day's walk from an all-weather road)

Ethiopia has a domestic savings rate of 3% to 4% of GDP (cf. 24% in India).

Poverty of this dimension means that the peasant has minimal personal defenses against drought and famine. Even in normal times, the bulk of the rural population lives on the margin of existence. The small surpluses they are able to build up in a good year are quickly dissipated by a drought.

## CURRENT VULNERABILITY TO FAMINE

- A combination of erratic weather, antiquated agricultural technology, human and animal pressure on the land, massive soil degradation, inadequate incentives for peasant farmers, inefficient marketing, limited availability of inputs, inaccessibility of most rural communities and a rapidly increasing population has led to a 22% decline in the per capita availability of grain in the last 10 years.
  
- Normal (5-year average 1979-80 to 1983-84) yearly grain production presently is 6.2 million metric ton. This total stands against a consumption need of 6.55 million metric ton (over the same period), leaving a deficit of 350,000 metric ton. Even without rainfall failures, this deficit will increase annually until the growth of agricultural production consistently exceeds the 2.9% growth in population.
  
- Agricultural research in Ethiopia began only in 1967. Due to limited manpower and financial resources, little progress has been made with the introduction of "Green Revolution" technology.
  
- Only 100,000 hectares out of a potential of 2.5 million hectares has been irrigated in Ethiopia.
  
- After these factors are combined with the limited use of dry-land farming techniques and short-maturing varieties, any appreciable aberration in rainfall results in 10% to 15% of the rural population being placed immediately and directly at risk of starvation.

## POLICY CONSTRAINTS

■ The World Bank, in its 1987 report on "Recent Economic Developments and Prospects for Recovery and Growth", has suggested certain pragmatic and practical policy adjustments to stimulate growth in Ethiopia which could be made within a socialist framework.

■ The report notes Ethiopia's comparative national advantages of size, location, competent civil service, exemplary economic management. Also, it notes the substantial achievements in social and economic infrastructure.

BUT

■ The report points out the adverse factors of poverty and underdevelopment; the shocks from famines, the continuing strife in the North; and the adverse trends in terms of trade, a low domestic savings and investment rate, accelerating soil degradation and high population growth. (2.9%)

■ The report also notes that the existing investment rate of 10% to 11% of GDP alone cannot sustain growth.

■ The World Bank report advocates strengthening incentives to farmers, improving marketing, developing a more efficient public sector, bringing prices more into line with scarcity values, making adjustments in the exchange rate, and making better utilization of the private sector and small-scale industry.

■ The Bank identifies a pressing need to increase flows of official development assistance. World Bank figures for 1987 indicate that Ethiopia receives only US \$15 (in terms of net disbursement) per capita in overseas development aid compared with US \$92 for Botswana, US \$94 for Somalia, US \$42 for the Sudan.

■ The government's recent announcement of agriculture pricing and marketing policy constitutes a major step towards the evolution of an appropriate policy for agriculture, but improvements in overall policy framework are urgently required for increasing the flow of aid.

## A ROLE FOR AID IN ETHIOPIA'S RECOVERY

■ For all its late start and rough political edges, the international relief operation launched in 1984 and continued through 1985 and 1986 was successful in saving hundreds of thousands of lives and mitigating much human suffering.

■ The relief operation was fueled by the worldwide compassion for the acute suffering of the Ethiopian people. It was distinguished by the generosity of the donor community as illustrated by the following figures:

	<u>1985</u>	<u>1986</u>
Food Aid	1.1 million MT	781,000 MT
Non-food Aid	\$681 million	\$201 million

■ Owing to political and policy differences, however, this generosity has not extended to support for Ethiopia's short- and long-term food security strategies.

■ Without such support, Ethiopia, having clearly insufficient resources to remove itself from the ever-present threat of famine, will become a permanent candidate for humanitarian relief and assistance.

■ To avoid this highly illogical and costly situation, donors might look more positively at helping with defensive food security measures such as building up an in-country food security reserve and relief distribution systems that would prevent local food shortages from developing into a famine (see: Drought Need Not Be Linked To Famine). Donors also might consider helping with environmentally-oriented reforestation and soil and water conservation programmes.

## DROUGHT NEED NOT BE LINKED TO FAMINE

- The experience of India over the past century indicates that widespread drought need not automatically lead to famine.
- By giving top priority to maintaining substantial food reserves at strategic locations in drought-prone areas and combining this effort with a well-managed food distribution system, it should always be possible to avoid famine.
- Moreover, the introduction of extensive and well-supervised public works programmes at times of drought can expand investment in rural infrastructure such as reforestation, roads, soil and water conservation, and irrigation. This would further improve defenses against famine and increase productivity.
- Vulnerability profiles and contingency planning--both central and regional--are essential to the good management of drought situations.

D R A F T

THE KEYSTONE INTERNATIONAL DIALOGUE SERIES  
ON PLANT GENETIC RESOURCES

SESSION I: EX-SITU CONSERVATION OF PLANT GENETIC RESOURCES

August 15-18, 1988  
Keystone, Colorado  
United States

DRAFT FINAL REPORT

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23, 27,

## I. INTRODUCTION

Evolutionary and revolutionary changes over thousands of years have resulted in our inheriting a rich genetic estate in the plant kingdom. Plants have moved within and between countries and continents both before and after the birth of agriculture. Plant introductions have been important for improving agricultural diversity, increasing productivity to feed the world, and developing new fibers. Thomas Jefferson once said "To add a new and useful plant is the greatest service you can render this new nation". With constantly changing agricultural practices, processing techniques and consumer preferences, the need for access to a wide range of genetic material to sustain dynamic crop improvement has become greater. In addition, the value of wild species and other material not yet used in practical plant breeding will continue to increase with advances in molecular biology that allow scientists to move genes across species barriers.

While, on the one hand, the realization of the significance of plant genetic resources for food and livelihood security is increasing, the threat to their continued existence is growing day by day. The destruction of the native habitats of many plant species due to deforestation, industrialization, urban expansion and a variety of other causes is proceeding unabated. Fortunately, in-situ conservation measures are getting greater attention now throughout the world. These conservation measures help conserve entire ecosystems including flora, fauna and rhizosphere organisms. While in-situ conservation is critical to conserving plant genetic resources and must be encouraged and promoted with the help of adequate financial and technical resources, ex-situ conservation measures involving both in vivo and in vitro techniques have become extremely urgent for ensuring that a representative sample of naturally occurring genetic diversity in plants is preserved for current and future use. Growing demands for food, fiber, fuel and security, as well as intergenerational equity, demand that we do everything possible to protect and preserve for current and future generations the rich global genetic estate we have been fortunate to inherit.

At the global level, there are significant and growing challenges to the preservation, use and exchange of plant genetic resources. Scientific questions of what and how to collect, conserve, and utilize continue to emerge. Social, political and legal questions persist regarding the ownership, exchange and availability of plant germplasm. While most of the naturally occurring genetic diversity is found in the developing third world, utilization of such resources needs to be enhanced. All of these factors have implications for genetic resource conservation policies and strategies. In spite of much increased awareness and concern, it is becoming clear that significant plant genetic resources are still being lost to humankind.

In the winter of 1987, The Keystone Center formed an International Steering Committee, chaired by Dr. M.S. Swaminathan, comprising scientists and policymakers from developed and developing countries to initiate and guide an International Dialogue Series on Plant Genetic Resources. The purpose of the Dialogue Series is to bring together the significant constituencies in a structured, off-the-record process, to develop consensus recommendations on the conservation and utilization of global plant genetic resources. The overall goal of the Dialogue Series is to examine and develop strategies for strengthening an international commitment to plant genetic resources. Specifically, the Series will focus on developing consensus recommendations and strategies regarding the availability, use, exchange and protection of plant germplasm. The Series focuses on both in-situ and ex-situ aspects of plant genetic resources.

Based on the advice of the Steering Committee, individuals from corporations, non-governmental organizations, government agencies, and research and academic institutions actively involved in global plant genetic resource issues were invited to The Keystone Center in Keystone, Colorado for the first plenary session of The Keystone International Dialogue Series on Plant Genetic Resources to discuss the following issues:

- The State of the Art of Germplasm Conservation
- Plant Genetic Resources Conservation Strategies and Responsibilities
- The Food and Agriculture Organization of the United Nations (FAO) Undertaking
- Plant Breeders' Rights and Farmers' Rights
- The Legal Status of Collections
- Approaches to Finance Germplasm Conservation
- The Role of National, Regional and International Institutions in Germplasm Conservation
- The Social and Political Aspects of Germplasm Conservation
- The Technology of Germplasm Conservation

In August of 1988, forty-one representatives from the international community met for four days at The Keystone Center to discuss ex-situ conservation. Within this context the Dialogue group agreed to address three critical areas: 1) the

scientific and technical aspects of germplasm conservation, including technological, geographic, organizational and communication gaps; 2) equity and ownership issues, including the definition of Common Heritage, ownership rights, inter/intra-generational equity and legal aspects; and 3) organizational aspects, including coordination, monitoring, information and finance considerations. In each area, the Dialogue group focused on the local, national, regional and international aspects of the problem and recommendations.

At the opening session of the Dialogue, participants agreed to three groundrules that characterize all Keystone dialogues:

- A. Participants attend as individuals.
- B. All conversations are off-the-record and not for attribution.
- C. No document will be made public without the consensus of all participants.

The group agreed that any document released should reflect the conversations that took place during the Dialogue and that the objective should be to develop a report that identified areas of consensus (defined as an idea or recommendation an individual is comfortable with), as well as clarifying areas of disagreement.

The following represents the report of the first plenary session of the Keystone International Dialogue Series on Plant Genetic Resources.

II. DEFINITION OF GENETIC RESOURCES  
OF ECONOMIC AND/OR SOCIAL INTEREST

As a starting point for this Dialogue, it was agreed that the five categories of genetic resources used in the FAO Undertaking of Plant Genetic Resources would be used as the basis for this discussion.

- A. Cultivated varieties (cultivars) in current use and newly developed varieties.
- B. Obsolete cultivars.
- C. Primitive cultivars (landraces).
- D. Wild and weed species, near relatives of cultivated varieties.
- \*E. Special genetic stocks (including elite and current breeders' lines and mutants).

The group recognizes that in addition to these ex-situ resources, in-situ resources play a very important role. This includes farming systems and co-evolution (i.e., disease hot spots).

Several observations were made regarding this definition:

- A. There was agreement that classifications 1 to 4 represent genetic resources requiring conservation and free access. While some in the group believe that all items in category 5 should also require conservation and free access, others believe that breeding lines should not be included in this category.
- B. Special genetic stocks were perceived to include specific mutants, monosomics, marker stocks, etc., primarily used in genetic research. The tradition for the exchange of research materials for the basic understanding of biological processes must be upheld. Temporary restrictions on free exchange pending publication are recognized as a part of research practice.
- \*C. It was suggested that breeding lines in general represent intermediate recombinations between any of the materials classified under categories 1 to 4 and the result would be ultimately available in category 1 (cultivated varieties in current use or new varieties). Apart from private ownership, many public plant breeders would also tend to consider breeding lines as proprietary research materials. The Undertaking, however, maintains that breeding materials should be

considered as a genetic resource. It was agreed that steps should be taken to explore how this conflict can be resolved, possibly through an agreed upon interpretation of the Undertaking that would acknowledge that, in certain countries, various forms of ownership have a legitimate role to play.

- D. The advent of biotechnology and transferable genetic codes raises some very important implications for the definition of genetic resources which will have to be addressed in the future. All items should be considered to have genetic potential which illustrates the importance of in-situ preservation. It is important that current activities not preclude future options with regard to biotechnology.

III. PURPOSES FOR PLANT GENETIC RESOURCES CONSERVATION

Plant genetic resources conservation is essential for addressing the present and future needs of human society, and is part of humanity's global obligation to conserve the world's natural resources. The conservation of plant genetic resources is essential for:

- A. Ensuring the availability and accessibility of these resources for the indefinite future for the food, fibre, health and energy needs of the world's human population.
- B. To conserve materials of unknown value for the meeting of future needs.
- C. To preserve genetic materials to be used for the advancement of knowledge of biological systems.
- D. To foster conservation of naturally occurring populations of species.

## IV. RESEARCH ACTIVITIES AND GAPS

Plant genetic resources activities are addressed with regard to the research needs, training needs and the gaps in ongoing activities. The range of activities are considered within five categories:

- A. Exploration and collection
- B. Maintenance
- C. Characterization
- D. Evaluation
- E. Enhancement

Research Needs

## Exploration and Collection

Improved methods to measure and assess genetic diversity both in the environment and in collections are needed. Such information is crucial to the rational planning of exploration and collection and will provide direction for taxa and regions that should be sampled. Additionally, it will be important for establishing national, regional and international priorities for collection and exploration. Knowledge of genetic structure of populations will aid in designing appropriate sampling strategies.

Greater emphasis is needed in the areas of biosystematics and modern taxonomy. Such technologies will be necessary to eliminate duplication and further aid the collection of cultivated crops and their wild relatives. Similarly, ecogeographic and ethnobotanic studies are important areas that need greater emphasis.

## Maintenance

Maintaining collections requires technologies that preserve both the viability of materials and their genetic integrity. Methods to monitor genetic diversity and its maintenance in gene banks are needed. Improved long term storage methods appropriate to the materials being maintained are also needed. Special attention must be given to pre-storage treatment of genetic samples.

The management of ex-situ materials will require strategies for designing collections, including the establishment of core

collections and other means of efficient germplasm conservation. In general, gene bank priorities should be directed towards landraces, primitive cultivars and wild species with limited acceptance of breeders lines. Establishing policies for priorities and the extent to which materials such as breeders lines are to be maintained should be the responsibility of each institution.

Methods are needed for the rapid, disease-free propagation of clonally reproduced species, and for the establishment of living collections and germplasm distribution. For seed-reproduced species, methods are needed to insure that pathogens are not inadvertently preserved along with seeds. For all materials, improved methods that will aid in the rapid screening for pests and diseases will facilitate quarantine practices.

#### Characterization

Improved molecular tools for the characterization of germplasm are needed. A more effective relationship should be established between classical taxonomy and modern methods of measuring genetic relationships.

#### Evaluation

The methods of evaluation will depend on the goals of the gene bank and its users. Collections may, for example, be concerned with evaluating their materials for drought tolerance, pathogen resistance or production under specific conditions.

#### Enhancement

It is necessary to elaborate efficient breeding methods to transfer genes that control characters of interest. These will involve enhancement of classical breeding techniques. Additionally, molecular-based gene transfer systems should be developed and utilized. Research should be directed towards the full utilization and enhancement of landraces.

#### Training Needs

There is an inadequate supply of trained personnel in plant genetic resources. Further, attrition, the movement of qualified personnel out of genetic resources activities, is a problem. It is necessary to train people in the field of plant genetic resources especially in the operation of gene banks using appropriate technology. Three levels of training should be considered:

- A. The technician level.
- B. The curator level (Master of Science (MSc), Ph.D. or equivalent).
- C. The scientist level (MSc, Ph.D., or equivalent).

The following needs for training have been identified:

- A. There are insufficient institutional capacities, especially at the technical and MSc levels. Training is insufficient and should be expanded at relevant locations at the regional level with an emphasis on practical training, using the most appropriate languages.
- B. Improvement and distribution of training aids, including manuals, video-tapes, etc.
- C. Special courses should be developed that address such topics as biotechnology methods, quarantine requirements and data base design and management.
- D. Universities should be encouraged to develop courses on genetic resources as part of undergraduate curricula

#### Gaps and Deficiencies in Ongoing Activities

Ongoing activities were considered in the following areas:

- A. Geographic gaps
- B. Communications gaps
- C. Organization and institutional gaps at the gene bank level
- D. Technology gaps

#### Geographic

Better, more complete information about the distribution of crop species and, particularly, the geographic coverage of present collections is needed. Inadequate information exists about genetic erosion of certain crop species and their wild relatives. Large geographic areas, such as many parts of Africa, have inadequate programs, but detailed information on present holdings and crop geographic distribution is still needed. Systematic knowledge concerning the distribution, diversity and use of crops

of limited distribution, but of local importance, is often inadequate.

Better identification of sites that are particularly suitable for evaluation of germplasm for biotic and abiotic stresses is needed.

More and better coordination among gene banks is needed at all levels to facilitate the assessment of geographic coverage of collections.

## Communications

Insufficient use is made of modern information systems in many gene banks. This inhibits the ability to transfer technical data from gene bank to gene bank and from gene banks to their users.

Reports on observations, interpretations and results of experiments should be improved through the encouragement of additional international newsletters, journals and scientific meetings.

Improvement is needed in the communication of general information to the public, policymakers, non-governmental organizations (NGOs) and others.

The lack of use of standardized descriptors for characterization creates significant inefficiencies for the management of genetic resources.

## Technology

Improvement is needed in instrumentation and methods for diagnosis of pathogens, for determining genetic identity, measuring genetic diversity and facilitating quarantine efficiency.

For storage of materials, several gaps exist. Improvement is needed in the storage and conservation methods for species having recalcitrant seeds. Nondestructive tests of seed viability need to be developed and applied. Greater attention should be given to solution of intractable problems in cryopreservation of plant materials.

## Exchange

The unrestricted exchange of all genetic materials may never be fully achieved for a number of reasons such as laws against distribution of certain species, embargoes, quarantines, patent rights or the lack of mechanisms to ensure reciprocity. These issues need careful attention.

V. DEFINITION AND IMPLICATIONS OF  
"COMMON HERITAGE" AND "COMMON RESPONSIBILITY"Definition

The group reaffirmed the importance of the concept of common heritage. The term common heritage was seen as retrospective, suggesting a form of ownership vested in the present human generations. Preference was given to a concept that would view genetic resources as borrowed or held in trust by present generations for future generations recognizing the tremendous contribution of past generations of farmers to the domestication and evolution of crops.

This implied the notion that any form of financial arrangements for conservation should reflect a common responsibility to today's and future generations of farmers to provide and encourage the preservation and utilization of appropriate genetic varieties.

Implications

- A. It takes financial resources to be able to make a system based on common heritage work. These resources are needed to support gene banking, evaluation and enhancement, as well as training and skill development in conservation.
- B. Having the ability to access germplasm resources is only part of what is needed. The value of a resource to a country depends on the country's present and future ability to utilize it. Therefore, support for genetic resources conservation should be supplemented by support for plant breeding activities.
- C. It was recognized that in most developing countries where market-oriented private breeding exists, public breeding programs are also necessary to provide appropriate resources for farmers and to provide them with a range of alternatives.

**VI. BREEDERS RIGHTS, PATENTS AND "FARMERS RIGHTS"**Breeders Rights and Patents

The group noted that the evolution of biotechnology may affect the traditional relationships of plant breeders' rights and regular patent law. It urged careful international analysis of various forms and applicability of these options of intellectual property protections. It also encouraged analysis of the relationships between public breeding sectors and the private breeding sectors encouraged by such protection. The group recognized that several forms of property protection are used in many countries, but, specifically, noted that the decision of whether an individual country would employ any form of intellectual property protection, or none, is solely a national prerogative.

There was agreement that the following objectives should be satisfied in any approach or combination of approaches that is used:

- A. Farmers should have the opportunity to have choices regarding the types and varieties of seeds available for them to purchase at reasonable prices. This should include the option to utilize cultivars that reproduce. The system should be sensitive to concerns regarding the concentration of the seed industry in a few large companies and should recognize the interest of countries in encouraging the development of domestic seed industries.
- B. The system should be able to meet its objectives in countries with different types of political and economic systems. What works well in developed countries might not work as effectively in developing countries.
- C. There is a need for effective public and farmer operated breeding programs as well as private breeding programs to provide options.
- D. The system should promote the continuing development of new varieties in order to expand farmers' choices as well as increasing genetic diversity.

"Farmers Rights'"

In the discussion, the concept "farmers rights'" was seen as a recognition that landraces have value as a result of the labors of many farmers over long periods of time. It was agreed that this is not just a north/south issue, but rather a recognition that contributions have been made by farmers everywhere. In addition, we recognize the local and regional contribution of those who develop and maintain minor crops.

VII. ORGANIZATIONAL ASPECTS OF COLLECTION,  
CONSERVATION, EVALUATION AND UTILIZATION

The Group considered the following issues relating to the collection, conservation, evaluation and utilization of plant genetic resources:

- A. Collection, conservation and sharing of plant genetic resources.
- B. Mechanisms for coordination.
- C. Monitoring and documentation.
- D. Information and awareness generation.
- E. Financial resources from governmental, industrial and non-governmental sources.

The above problems were discussed in the context of the action needed at the local, national, regional and global levels. The views of the group are presented in the above five dimensions.

Local Level Action

Ultimately, conservation consciousness and action have to begin at the level of local communities. The work of the community and of National Plant Genetic Resources Centers must be mutually reinforcing. Particular attention should be paid to free landraces or locally adapted ecotypes of pathogens, as pathogen-free locally adapted material may well be able to compete with modern high-yielding varieties. The involvement of the local community in plant genetic resources work is essential to foster a development ethic based on ecologically sustainable farming systems.

The important contributions which farming families can make in the following aspects of plant genetic resources work need to be widely recognized and supported:

- A. In-situ conservation.
- B. Maintenance of landraces and life support species.
- C. Multiplication of vegetatively propagated plants.
- D. Protection of endangered species.
- E. Early warning of potential genetic erosion.
- F. Collection of primitive cultivars.

- G. Regeneration of local collections.
- H. Evaluation for adaptation to local growing conditions.
- I. Information gathering and dissemination.
- J. Community seed banks and genetic gardens.

Support systems needed to stimulate and sustain action at the local level. The following aspects need particular attention:

- A. Foster linkages among local communities, NGOs and scientific institutions and universities.
- B. Training in seed technology and genetic conservation should be organized for rural people. Rural women, in particular, who have traditionally played an important role in seed selection and conservation, need to be involved actively in conservation programs through training. There are good examples of involvement of women in seed programs in Nepal and Zimbabwe under projects sponsored by US AID and WINROCK.
- C. Seminars and workshops which can help to foster symbiotic linkages between the formal conservation system (gene banks, botanical gardens, etc.) and the informal community sector should be organized. An example of the kind of informal/formal cooperation possible between NGOs and scientific institutions can be found in the series of workshops conducted by Rural Advancement Fund International (RAFI) with the seeds action network in Asia, Africa and Latin America and in numerous national workshops sponsored by RAFI together with national NGOs.
- D. Schools, colleges and universities should initiate cooperative programs with the local community in organizing simple, low-cost seed storage systems, botanic gardens and ethno-botanical studies. Youth involvement in such work is particularly important in developing countries where often more than 50% of the population is below the age of twenty.

#### Financial and other Requirements

To promote a self-sustaining and self-replicating system of community participation, government agencies should provide the appropriate scientific back-up and training. There is need for the compilation of information and evaluation of NGOs' efforts at periodic intervals. By promoting mutually complementary linkages

among the community organizations, scientific establishments and educational institutions, there could be greater returns from ongoing work and investment.

National and international NGOs, FAO, International Board for Plant Genetic Resources (IBPGR), International Union for the Conservation (IUCN), United Nations Environment Programme (UNEP), private industry, the World Bank and United Nations Development Program (UNDP) can help to document successful examples of community involvement in plant genetic resources activities. They can support initiatives intended to replicate successful experiences and examples.

Local communities have played an important role in plant genetic resources conservation since the dawn of agriculture. The challenge lies in harnessing the time and talent of rural women, men and children in conserving the plant genetic resources of their respective regions.

The National Policy on Plant Genetic Resources of every country should promote an integrated conservation strategy involving the local communities and professional organizations and NGOs.

#### National Level

Plant genetic resources conservation and utilization are important for the food and livelihood security of the growing global population. Plant genetic resources helps to accelerate the pace and effectiveness of plant breeding research. In addition, plant genetic resources work helps to promote the conservation of ecosystems. The opportunities for gene transfer opened up by recombinant-DNA technologies have made plant material formerly considered only of theoretical interest to be extremely important in practical plant breeding work. Also, the prospect of global atmospheric changes leading to significant alternative in temperature, precipitation, ultra violet radiation and ocean levels underline the urgency of conserving a wide sample of genetic variability for screening and for use in the future. Tomorrow's ideal gene pool may be very different from that of today. Therefore, intergenerational equity demands that all nations must have a commitment toward plant genetic resources conservation.

For giving practical shape to such a commitment, every nation should have a well-defined national plant genetic resources policy and an effective and adequately supported instrument for implementing policy. We make the following recommendations to help in achieving these goals:

- A. Establish, where this has not yet been done, a well-defined National Policy towards plant genetic

resources. This should include a long term commitment to germplasm conservation, to global availability of plant genetic resources, and, where appropriate, to both in-situ and ex-situ conservation.

- B. Set up a National Commission or Committee or Bureau to implement the National Policy on plant genetic resources. The following are some of the tasks which the National Plant Genetic Resources Commission/Committee/Bureau can undertake:
1. Provide technical and policy advice to government.
  2. Development of the necessary infrastructure, such as maintenance of living collections, and short and long term seed storage facilities.
  3. Collection and dissemination of information.
  4. Organization of germplasm exchange and plant introduction.
  5. Organization of the necessary quarantine facilities.
  6. Training programs both for professionals and community workers.
  7. Development of a National Data Base System for germplasm collections.
  8. Promotion of appropriate national, regional and international linkages.
  9. Strengthening the feedback relationships between genetic resources conservation centers and plant breeding institutions.
  10. Organize programs for gathering data on a continuing basis to evaluate economic returns from plant genetic resources activities.
  11. Establishing a formal access path to government funding sources to permit rapid and effective contacts to deal with financial matters.
  12. Helping to improve the social prestige and recognition of germplasm conservation workers.

The composition of the National Committee on Plant Genetic Resources should include:

1. Government departments/institutions.
2. Non-governmental organizations, including representatives of farmers' organizations.
3. Academic institutions.
4. Independent experts in relevant fields.
5. Industrial organizations (where appropriate).

The National Committee could set up sub-committees or task forces to deal with the problems of specific crops or groups of crops such as medicinal plants, fruit or fuelwood trees, etc.

#### C. Infrastructure Development

An important task of the National Committee is to promote government action that will ensure that the basic minimum facilities for conservation, evaluation, documentation and utilization exist. Screening sites for evaluation of germplasm for resistance to biotic and abiotic stresses should be established. The requisite number of personnel for germplasm facilities should be trained.

#### D. Financing

For achieving the above tasks, governments should provide adequate human, financial, land and other facilities. A long term commitment of the minimum essential core budget for safeguarding the security of germplasm collections is essential.

If a national policy and strategy for plant genetic resources exists, it will be possible to deploy the funds available from government, NGOs, bilateral and multilateral sources effectively for filling critical gaps in national efforts and infrastructure.

It is not necessary for every country to have sophisticated long term seed storage facilities. The precise infrastructure needed will have to be determined based on the priority requirements and on options that could take advantage of other existing facilities and international networks.

Regional Activities

In recent years, regional political and economic organizations have emerged. These provide unique opportunities for strengthening regional cooperation in plant genetic resources activities. The following measures will help us to derive full benefit from regional organizations.

- A. A Regional Plant Genetic Resources Policy Advisory Committee under the umbrella of organizations like Southern African Development Coordination Conference (SADCC), Latin American Economic System (SELA) and Association of Southeast Asian Nations (ASEAN) will help to provide a structured direction to collaborative work in plant germplasm collection, conservation, evaluation and utilization. The Regional Plant Genetic Resources Committee should consist of the chair persons of the National Plant Genetic Resources committees.

Add  
SARC

The Regional Committee could help to optimize the benefits from the existing infrastructure in the region and to fill critical gaps in current activities and facilities. It should review and help to strengthen plant quarantine facilities. The Regional Committee could set up crop specific Task Forces to provide detailed attention to the important crops of the Region.

- B. Regional Facilities: Steps are needed to promote sharing of expensive infrastructure. Increasingly, regional gene banks are coming into existence. The Nordic Gene Bank and Centro Agronomico Tropical de Investigacion y Ensenanza (CATIE) Gene Bank, located in Costa Rica for the benefit of countries in Central America, are outstanding examples of the value of such regional cooperation. The Nordic Gene Bank, in addition to establishing a seed storage facility near Lund, Sweden, has also established a low cost duplicate repository utilizing the permafrost conditions in the Spitzsbergen Islands, Norway.

The SADCC countries have prepared a proposal for a Regional Gene Bank on the lines of the Nordic Gene Bank. It is advisable to promote such regional cooperation since this will be both economical in terms of cost of construction and maintenance and efficient in terms of management. Regional quarantine facilities are also needed.

C. Regional Professional Associations

Associations which provide opportunities for the plant genetic resources professionals in a region to get together and work together deserve full support from governments. Such Associations can help to promote mutually beneficial collaboration in germplasm conservation and utilization and make plant genetic resources activities relevant to the needs of the people of the region. Further, they can help to promote meaningful international collaboration in a concerted manner. They can help to optimize the benefits from expensive long term seed storage facilities and monitor the extent and causes of genetic erosion. Thus, they can help to identify priority areas/crops for collection and conservation and document the economic benefits from conservation work. We are happy that such regional professional organizations are emerging in Africa, Latin America, Asia, Europe and North America. They deserve full support from regional political organizations and from the international scientific and donor community.

Several regional conservation groups exist which are concerned with in-situ conservation, such as the network of Latin American Conservation Data Centers sponsored by The Nature Conservancy. There are also regional botanic garden networks, such as the Ibero-Mediterranean Association of Botanic Gardens, whose programs include both in-situ and ex-situ conservation of local species. European Association for Research on Plant Breeding (EUCARPIA) and Society for the Advancement of Breeding Researches in Asia and Oceania (SABRAO) are examples of professional organizations with special committees for plant genetic resources functioning in Europe and Asia and Oceania respectively. An African Plant Genetic Resources Committee (APGRC) has been established to foster mutually supportive collaboration among African countries by bringing professionals together to advise their governments on genetic resource activities.

D. Regional Cooperative Agreements

There are several examples of regional cooperative agreements. Collaborative agreements can promote sharing of facilities and organization of regional training programs. The United States, Canada and Mexico collaborate on plant genetic resources. In Latin America and the Caribbean, 22 countries have established an inter-governmental committee (CARFIT) and a regional program on Preservation and Utilization

of plant genetic resources in line with the FAO International Undertaking and including the establishment of a network of gene banks. Twenty-six European countries participate in the European Cooperative Programmes for Genetic Resources. Countries of the National Economic Assistance (COMECON) group in eastern Europe also participate in their own regional plant genetic resources activities. Such regional cooperation should be promoted.

E. Regional Efforts on an Ecological Basis

In regional organizations formed on a political basis, important centers of genetic diversity may be left out. For example, SAARC does not include Burma. Similarly, Kampuchea, Laos and Vietnam do not belong to regional organizations. It is desirable that the relevant regional plant genetic resources Committee includes in its membership representatives of governments which may not officially belong to the regional organization but which may have plant genetic resources requiring attention from the point of view of collection, conservation, evaluation and utilization.

F. Funding

In regions where there is a long term regional commitment to collaboration in plant genetic resources activities, bilateral and multilateral donors, in addition to the governments of the countries concerned, should provide funds for strengthening the infrastructure for plant genetic resources work including conservation, data bases, quarantine facilities and training programs both for professional and for community organizations. Priority in resource allocation should go to optimizing the benefits of the available regional facilities and for fostering effective linkages between plant breeding institutions and germplasm centers. Similarly, regional quarantine facilities need to be developed. Evaluation and documentation of economic benefits should also receive financial support.

Global Level

At the global level, many agencies are involved in different ways in plant genetic resources activities. Some illustrative examples are given below:

A. Intergovernmental Organizations

FAO, UNDP, United Nations Educational, Scientific and Cultural Organization (UNESCO), United Nations Industrial Development Organization (UNIDO), World Health Organization (WHO), International Bank for Reconstruction and Development (IBRD) and FAO-International Bank for Reconstruction and Development (IAEA) Joint Division.

B. Non-Governmental Organizations

1. Non-Governmental Professional Organizations

IUCN, International Council of Scientific Union (ICSU), ~~World Wildlife Fund~~ (WWF) and World Conservation Monitoring Center.

*World Fund for Nature*

2. Other Non-Governmental Organization

International Organization of Consumers' Unions and Seeds Action Network.

C. Consultative Group on International Agricultural Research

IBPGR and several International Agricultural Research Centers (IARC) are actively involved.

D. International Funding Agencies

1. Bilateral Donors: technical Assistance agencies of many governments.

2. Agencies with international boards of trustees: International Development Research Corporation (IDRC), Australian Center for International Agricultural Research (ACIAR) and Ford Foundation.

3. Foundations: Rockefeller Foundation and Sasakawa Foundation.

The following areas were recognized as needing attention at the global level:

1. Structures to promote political will and action.

2. Organizations to provide scientific and technical help and coordination.

3. Information dissemination.
4. Financial support.

Based upon these areas of recognition, institutionally based suggestions are offered to strengthen the commitment to plant genetic resources and to provide for political dialogue.

#### Strengthening Political and Policy Support

- A. International and inter-governmental concern for plant genetic resources has been expressed in global fora at least since the first FAO meeting in 1946. An important resolution on plant genetic resources was passed at the Stockholm Conference on Human Environment in 1972. The World Conservation Strategy developed by IUCN, WWF and UNEP in cooperation with FAO, UNESCO and other organizations was designed to provide a framework for promoting sustainable development. More recently, the World Commission on Environment and Development (WCED), in its report submitted in 1987, has underlined the urgency of plant genetic resources conservation.

Despite these expressions of international and intergovernmental concerns, serious problems of international cooperation continue to plague the world community.

- B. The FAO Commission on Plant Genetic Resources was established in 1983 for implementing the International Undertaking on Plant Genetic Resources and to recommend measures that are necessary or desirable in order to ensure the comprehensiveness of the global system and the efficiency of its operation in line with "the Undertaking". The Commission has done valuable work during the past four years and has generated a great deal of political will and commitment for conservation and exchange of plant genetic resources. The International Undertaking on Plant Genetic Resources, adopted in 1983, is a flexible legal framework "based on the universally accepted principle that plant genetic resources are the heritage of mankind". Its objective is "to ensure that plant genetic resources of economic and social value, particularly for agriculture, will be explored, preserved, evaluated and made available for plant breeding and scientific purposes". To date, 114 countries have become members of the Commission and/or have adhered to the International Undertaking<sup>1</sup>.

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<sup>1</sup>In some cases with reservations.

C. For achieving the goals set by WCED, it was felt that all countries of the world should be able to play an important role in the FAO Commission on Plant Genetic Resources. For that purpose, a mechanism for a wider participation in the Commission deserves to be looked into. We suggest that the following two alternatives be examined:

1. That FAO may find a way to include, as full members of the commission, non-FAO member countries.
2. Alternatively, that FAO consider the possibility of expanding the present FAO Commission into a United Nations-FAO (UN-FAO) Commission. The reports of this Commission could be considered by both the UN General Assembly through United Nations Economic and Social Council (ECOSOC) and the FAO Conference through the FAO Council.

It may be expected that in either case the Commission could gradually evolve into a Commission on Biological Diversity.

#### Scientific and Technical Tasks

At present, the scientific and technical aspects of plant genetic resources activities are being attended to by FAO, IBPGR, IARC's of Consultative Group on International Agricultural Research (CGIAR), UNEP, and IUCN. There is need to examine carefully the adequacy of existing mechanisms and to develop procedures which can help to optimize the impact of these organizations.

Almost from its inception, FAO has been playing an important role in promoting the conservation of plant genetic resources. Since 1974, FAO has been providing staff, accommodation and other facilities to IBPGR and has been a helpful facilitator of IBPGR's global activities. We feel that this partnership between FAO and IBPGR has been to the advantage of plant genetic resources. Since 1987, IBPGR has been an autonomous center of the CGIAR, housed in FAO, and a mutually beneficial collaboration with FAO should continue.

We further feel that FAO-IBPGR collaboration, which has been playing a leading role in plant genetic resources work, is well suited to perform the following tasks with the assistance of appropriate IARCs (for example, with IRRI in the case of rice).

- A. Develop an interactive relationship with the FAO Commission on Plant Genetic Resources (or to the proposed UN-FAO Commission) on scientific and technical aspects of the Commission's activities.

- B. Help strengthen the national capability of developing countries in the collection and conservation of plant genetic resources with particular reference to documentation and training.
- C. Help promote, organize and provide technical support to functional crop networks of active and base collections of major food plants.
- D. Continue research to secure the knowledge base of crop genetic resources conservation and devote more attention to the development of simple, low-tech, low-cost techniques of ex-situ storage adapted to local community needs.

Every attempt should be made to maintain duplicate sets of base collections at suitable locations. Appropriate National Research Systems can perform global functions in the maintenance of base collections, when they are in a position to do so.

The role of National Research Systems is of prime importance in plant genetic resources work. Evaluation of material, regeneration, data base development, etc., can be done by National Agricultural Research System (NARS) with assistance, when needed, either from IBPGR, or an IARC. IBPGR-IARC-NARS collaboration needs to be strengthened and extended to joint planning of collection work and implementation of other plant genetic resources activities.

IBPGR and the IARCs deal only with a selection of crops; there is, therefore, a need for scientific and technical advice and action on a wide range of other plant genetic resources. IUCN can provide scientific and technical expertise on in-situ conservation and through its Botanic Garden Conservation Secretariat give advice on the ex-situ conservation of local crop species and wild species of special value.

The FAO field program covers a large range of technical activities related to plant genetic resources within the general context of agriculture and forestry research and development at national, regional and international levels. It also includes projects on protections, on-site conservation and sustainable development of ecosystems.

IBPGR, the IARCs, and IUCN could serve as technical advisors to the FAO Commission so as to cover the whole spectrum of expertise needed for taking political decisions relative to plant genetic resources conservation and utilization.

Global Independent Advisory Committee  
for Plant Genetic Resources

As mentioned earlier, several global and regional organizations are engaged in promoting research, training and development activities related to plant genetic resources. In order to get all issues relating to plant genetic resources discussed in a holistic and interactive manner and to create a mechanism for providing technical advice on the effective utilization of the proposed International Fund for Plant Genetic Resources, we suggest that a Global Independent Advisory Committee for Plant Genetic Resources be established. The membership of this Committee should include a broad spectrum of scientific expertise. The expertise available with organizations such as FAO, IBPGR, IUCN, IARCs, NGOs and Industry could be tapped for helping the Committee. Such a Committee could help to provide a global overview on policy, programmatic and financial issues related to plant genetic resources work.

Such a Global Advisory Committee could:

- A. Assess and review plant genetic resources needs.
- B. Provide advice to the FAO Commission.
- C. Help to prepare every two years a report on the State of the Plant Genetic Resources of the World.

This a report could be discussed at meetings of the FAO Commission on Plant Genetic Resources, CGIAR Centers work, UNEP Governing Council, IUCN council and other appropriate fora.

- D. Monitor and help to increase the flow of financial resources for plant genetic resources activities.

#### Financing

There are major gaps in ongoing plant genetic resources work with reference to regions and crops. There are very few well managed long term seed storage centers. Habitat destruction, including tropical rain forest denudation, is proceeding at a fast pace. Several mountain and coastal ecosystems, which are important repositories of plant genetic resources, are in various stages of degradation. Genetically diverse landraces of food crops are becoming replaced by uniform modern varieties while, at the same time, plant breeding has increasing the need for genetic variation as it moves to less favorable environments.

The tools and techniques of biotechnology are opening up new possibilities for transferring genes across sexual barriers.

Thus, the urgency of stepping up work on plant genetic resources, particularly in economically underprivileged and ecologically fragile areas, cannot be over-emphasized. It is an enormous task to ensure the security of collections, evaluation and documentation of material and the effective utilization of germplasm resources for the purpose of improving the productivity, stability, sustainability and profitability of major farming systems in all the continents. The current available funds, both at the national and international level, are totally inadequate. In spite of a large number of organizations that profess concern with genetic resources, actual action remains insufficient for the work which needs to be done.

We, therefore, suggest the following additional measures for enhancing the flow of financial resources for plant genetic resources work.

- A. Global Funding Facility for Plant Genetic Resources.  
We note that FAO has already established an International Fund for Plant Genetic Resources. We have also noted the recent initiative of FAO, UNDP, World Bank, World Resources Institute and the Rockefeller Foundation in raising substantial resources for the protection and regeneration of tropical forests. This Tropical Forestry Action Plan (TFAP) can be a useful model for the establishment of a funding facility for global plant genetic resources activities. We request the organizations concerned with TFAP and others who are committed to the conservation of plant genetic resources get together and promote a funding mechanism which can help to generate financial resources of the order of magnitude essential for meeting satisfactorily the quantitative and qualitative dimensions of the challenges facing us in plant genetic resources work.

Several important issues were defined which need to be explored as part of the full implementation of such a fund.

It was suggested that all countries should be obliged to contribute some amount to the fund because it would benefit all of humankind. It was felt that governments should be responsible for making the payments and that the decision regarding how they raise the funds should be left up to each country. The determination of how and how much each country contributes would have to be made on some type of equitable basis. This could be determined based on the value of seed usage or sales or some similar concept. A careful needs assessment will need to be conducted to establish the size of the fund.

The organizational structure that would be responsible for managing the fund would have to have a governance structure that is responsive to a wide range of interests. Both those that provide and those that utilize plant genetic resources would have to be represented in an equitable manner.

We suggest that the fund model be evaluated with regard to how it would involve and affect countries, farmers and the private sector. The question whether the fund should be used only for activities relating to plant genetic resources conservation or whether it could also support training and infrastructure development needs consideration.

B. Incentives

In addition to making contributions to the fund, all governments should develop incentives for motivating industry and the broader non-governmental community to support plant genetic resources activities.

C. Donors

Both bilateral and multilateral donors should consider stepping up their support for plant genetic resources work, particularly for the priority tasks identified by the Global Independent Advisory Committee.

D. CGIAR. The CGIAR should consider increasing and earmarking support for plant genetic resources through the IBPGR and appropriate IARCs.

It is our conviction that if the steps we have recommended at the local, national, regional and global levels are implemented in a mutually interactive and reinforcing manner, the vision of WCED on our common future with regard to the sustainable use of our natural heritage can be realized at least with reference to plant genetic resources.

## VIII. FOLLOW-UP AND NEXT STEPS

Dialogue participants urge the Chairman of the Dialogue to convene a representative subset of the Dialogue group to follow-up on the dissemination of this report and to facilitate the implementation of the recommendations. Dialogue participants see the need for additional Dialogue sessions to address:

- A. Further developments on issues relating to definitions, rights and incentives and a global funding facility.
- B. The active involvement of local communities in plant genetic resources activities through an effective integration of in-situ and ex-situ conservation measures and of traditional and frontier technologies such as biotechnology and computer sciences.

KEYSTONE INTERNATIONAL DIALOGUE ON  
PLANT GENETIC RESOURCESFirst Plenary Session  
August 15-18, 1988  
Keystone, Colorado

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