

Benefit/Cost Analysis of U.S. Demining in Ethiopia and Eritrea

A Benefit/Cost (B/C) Analysis is a tool used to compare the rewards reaped by a program to the costs expended to accomplish it. The author discusses the B/C analysis of demining operations in Ethiopia and Eritrea and extrapolates the meaning of the results.

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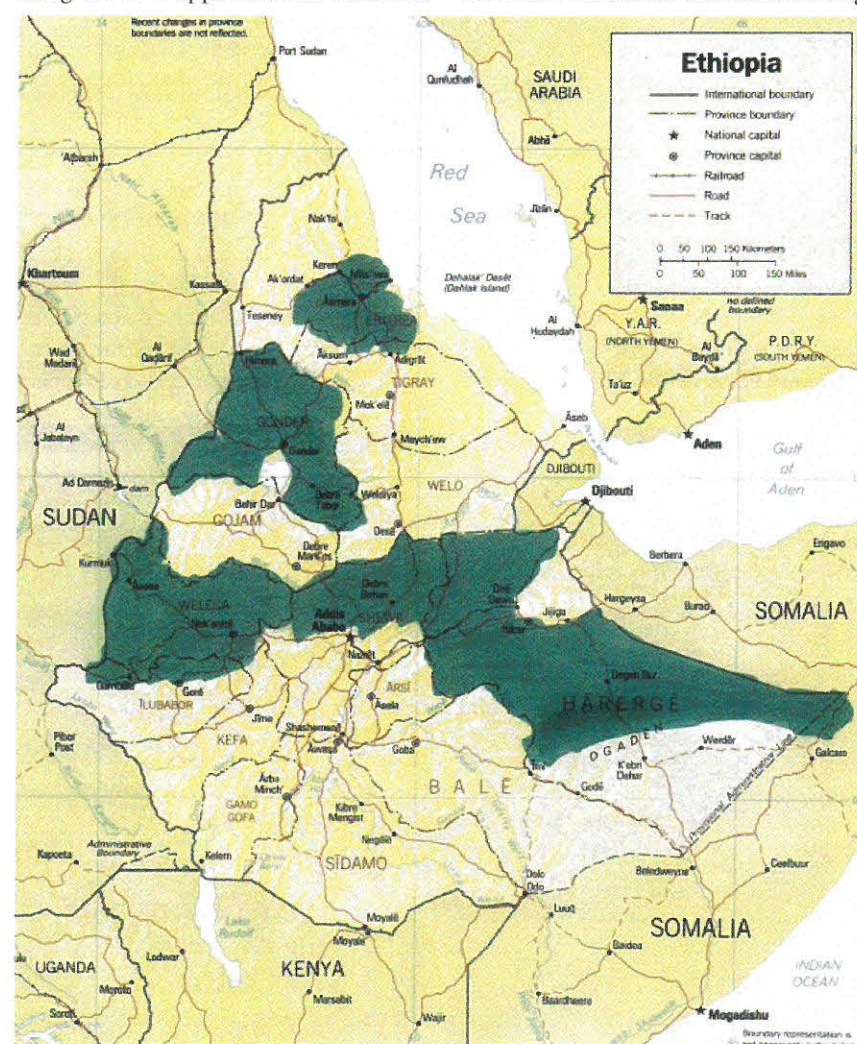
Based on B/C theory, an analysis comparing the benefits to the costs of a program (benefits and costs received now and later, quantifiable and non-quantifiable) can be determined to assist the United States in controlling AP landmines through an American-led demining program. In this study, B/C analysis is used as a tool to evaluate the issue of the relevancy of using Department of Defense (DoD) dollars for a particular kind of humanitarian assistance program, demining AP landmines.

There is an important U.S. interest to control landmines, especially those that are imbedded in the land of countries that are of national and vital interest to the United States and its allies. Reducing or eliminating these weapons may help to stabilize an important area and region inimical to U.S. interests. The existence of landmines has led to economic and political calamity and creates a greater chance of them being used by a faction or group against innocent civilians or even U.S. personnel. AP landmines may sustain a culture of conflict and violence. Therefore, it may be in the United States' interest to ultimately assist in eliminating these indiscriminating weapons, which could be of direct benefit to the United States and host nations (HNs).

Data will be reviewed to calculate

primary and secondary costs saved as a result of the U.S. Army's demining program in Ethiopia and Eritrea. This study will measure the social costs of landmines using the B/C approach and the social

cost of removing the mines by quantifying as many primary and secondary benefits as possible. Examples of primary benefits include preventing loss of life and limb. Secondary benefits may include land, farming and infrastructure, which are part of an economic/social benefit and which can be used as a result of demining.



Measuring Benefits and Costs

The U.S. government (USG) Demining Program Funds, which are the actual sources of the (U.S.) funds and costs from FY93–FY97 of the Demining Program will be analyzed, as will the total amount of funds used for demining in Ethiopia.

Matrixes of compiled performance impact data will be used to indicate some of the HN benefits of the Demining Program, although the reader should keep in mind that some of these impacts, taken by themselves, are non-quantifiable. This data was acquired from the Special Operations (Central) Command, MacDill Air Force Base, which received the data from the demining centers in Addis Ababa, Ethiopia, and Asmara, Eritrea, and should be considered reliable. This study will recommend the demining program if there is a greater excess of benefits over costs; and if the total projected benefits are less than the total costs, the project will be deemed not worth undertaking.¹

Costs from AP Landmines²

Much of the costs from FY93–FY95 were used for the initial start-up cost of the demining infrastructure, which included renovating the demining headquarters and the training facilities, etc. These were the most significant costs at the start of the program. U.S. Army trainers and liaison personnel were sent to the HN in 1995 in order to complete the start-up phase and train the trainers. The total number of mines eliminated is important in respect to the fact that there are mines that could kill or injure if left in place. The number of hectares (one hectare is equal to 10,000 square meters or 2.471 acres) and amount of roadway cleared indicates land that is now available for productive use.

In sum, in Ethiopia, \$6,089,000 (U.S.) was spent from FY93–FY97 to eliminate 325,625 mines that could potentially have caused injuries or death. As a result of demining, over 7,391 hectares have been cleared and are available for productive use, 285 kilometers of road

are now available to the populace, and 159 villages were cleared of landmines. For Eritrea, \$6,005,000 was expended for the demining program during this time period, and, as a result, 43 villages were cleared. Over 4,750 landmines were eliminated. As a result of the demining, over 261 hectares were cleared, and 35 kilometers of road are now available for productive use.³ The dollar contributions of the HNs were not available.⁴

Primary and Secondary Benefits⁵ or Costs Saved

Primary benefits include preventing people from being killed, injured or maimed by landmines, as well as the benefit of saving medical costs to treat and rehabilitate personnel. Additional benefits that are directly due to demining include evacuation of the wounded, surgical treatment, transfusion of blood, rehabilitation (often including prosthetic limbs, which must be fitted individually and must be replaced after some years). Severe disability can lead, of course, to other incalculable costs.^{6,7} Economic and social consequences of mines, which also translate to secondary benefits, might include farmland, firewood and drinking water that would have been inaccessible because of the mines, as well as roads or tracks that would be impassable because of the landmines.

This study used data from Anderson's study, which documented the effects of landmines on the health and social conditions of communities in 32,904 households with 174,489 people living in communities of four affected countries, including 37 in Afghanistan, 66 in Bosnia, 38 in Cambodia and 65 in Mozambique. Since Mozambique is similar to Ethiopia and Eritrea in many ways (culturally, geographically, etc.), this study used these findings as a surrogate market, as suggested by Gramlich,⁸ to extrapolate some of the possible costs saved for Ethiopia. For example, this research determined the costs of death and injury based on data from Ethiopia, using the following information from Mozambique: in Mozambique, each blast killed 1.45 people and wounded 1.27. Roughly 40 percent of blasts resulted in

death. Based on expected production without the mines, agricultural production could increase by three to six percent. There were also costs associated with disabilities. The most common injury among survivors of landmine incidents is the loss of a leg. Many victims had to undergo multiple operations for their injuries. More than half of all victims were admitted, each spending an average of two months in a hospital.

Analysis

The primary benefits that this study will consider include lives saved (deaths from each blast), injuries prevented (injuries from each blast), transportation saved (cost of fees to the hospital), admission charge saved, bed charges saved, blood saved (or cost of blood saved) and amputation costs saved. Some of those figures for the method were taken from the study dealing with Mozambique.⁹

All of the benefits of demining, however, cannot be quantified.¹⁰ The study focused on only those benefits that can be quantified, such as the benefits of human life, the benefits obtained from using land that was once mined and the future benefits from saving the lives of farm animals.¹¹

In order to calculate whether the demining program will have net benefits over time, this study calculated present values. Present value is a stream of benefits or costs expressed as the expected value in each year, discounted by the interest rate compounded over that time. Non-comparable benefits and costs can be made comparable by expressing everything in present value terms, which could indicate benefits realized over a period of time. Costs, especially for the start-up (i.e., building infrastructure), will be indicated up-front, while some costs, such as monitoring the demining progress, will be recurrent. In this case, the study traced out costs and benefits over time (i.e., over a 30-year period, or other projections in the future) and potential maximum benefits.

Calculating Primary Benefits of Demining

Costs of lives saved is calculated using \$550 in Ethiopia and \$660 in Eritrea, the 1998 annual per capita income (per capita used since all victims would include men, women and children), and multiplying by the average number of lives saved per year as a result of the demining program. Data in the last couple of years for Ethiopia indicate between 60 and 120 lives are lost due to the landmines per year. Approximately 76 lives were lost in FY97; divided by 1.45 (52 blasts), this yielded 76 deaths. Seventy-six lives saved multiplied by \$550, would mean \$41,800 saved in Ethiopia for one year. Eritrea lost an average of 10 civilians in FY97, 10 lives saved multiplied by \$660 yearly per capita income equals \$6,600 saved per year.

Calculations of other benefits were

as follows:

- Injuries prevented: In Ethiopia, 44 persons injured divided by 1.27 from 35 blasts, which yielded 44 injured (Anderson 1995).¹² Eritrea averaged 20 persons injured per year.
- Transportation costs saved: Fees to a hospital could range from \$2.40 to \$4.80.¹³ This study used the lowest, conservative number (\$2.40).
- Admission charge saved: the admission charge saved could range from \$2.40 to \$16.00.¹³ Again, this study used the lowest conservative number (\$2.40).
- Bed charges saved: Bed charges (flat rate fee) saved has been approximated to be \$.80.¹³
- Blood saved: Generally, for every 100 landmine patients, 120 units of blood are required. A unit of blood costs

about \$20, and a unit of saline costs approximately \$1.00.¹⁴

• Amputation costs saved: Mine amputees may require a total of 320 units of blood per 100 patients.¹⁴

• Rehabilitation costs saved: It costs approximately \$125 to replace one limb. The lower boundary for this study is the income for men, women and children (per capita) for workers or non-workers. In regards to the wages of the Ethiopian deminers, the wages are the same as they receive while serving in the Ethiopian army. They cannot leave a job in the army since other jobs would be difficult to find. It does not matter how the individual deminer values their life (utility).¹⁵

Data Used to Calculate Secondary Benefits of Demining

This study was able to quantify the dollar value of cultivable land and accessible grazing land, as well as the increase of forestry as a result of land being demined, using gross domestic product figures for FY93 for commercial purposes (agriculture, grazing, forestry and fishing), using projected present value at FY97, and data of cleared land from FY97.

Calculation of secondary benefits were as follows:

• Total area cleared: For one year in Ethiopia, the total area cleared was 6,112 hectares or 15,102 acres, and for Eritrea, 261 hectares cleared or 645 acres. The value per acre of land in Ethiopia is \$14, whereas in Eritrea, which is three times smaller and much more arid and dry, the value per acre is \$93.40.

• Increase Cultivable Land: Of Ethiopia's total land, 12.7 percent is used for growing crops, and in Eritrea, only five percent of the land is considered arable.

• Accessible Grazing Land: In Ethiopia, 40.8 percent of the total land is used for grazing, which also applies to Eritrea.

• Forestry/Wood Industry: Of Ethiopia's total land, 24.6 percent is used as forest and woodland, whereas only five percent of Eritrea's land is used for these purposes.

• Livestock Saved: In Ethiopia, 1,478 animals were lost in FY97, which when multiplied by \$114, the value for

each animal lost, is equal to \$168,492 in animals saved by demining. Eritrea only lost a reported total of six livestock due to landmines in FY97. This amounts to a value of \$916 lost in that year.

The total worth of the above primary and secondary benefits over time was calculated using percentages of discount rates, calculating the net benefits for the present value (tracing out costs and benefits over time) of the maximum benefits over 10, 12, 15, 20, 25 and 30 years at the discount rates of three percent (minimum rate), five percent and 10 percent (maximum rate).

The net benefits for each of the above periods at each of the above discount rates is composed of the addition of primary and secondary benefits, which equals total benefits, and which is a rea-

sonable range over time. The total cost of the program (FY93-FY97) is then subtracted from the total benefits in order to calculate the net benefits. These calculations could also demonstrate the option of doing nothing. Sensitivity is the change of assumptions, such as the number of potential victims saved and the ranges of plausible values. The Net Benefits Spreadsheet for both Ethiopia and Eritrea (listed below) enabled this study to find the range of reasonable values, comparing the discount rates with the maximum benefits over the above years.

The Net Benefit Spreadsheet indicates that shortfalls or costs are greater than the benefits and were almost exclusively and predictably evident throughout the demining process evident in both Ethiopia and Eritrea, regardless of the

discount period or year. The data and analysis indicates that demining is not an appropriate B/C study for the United States when only the quantifiable benefits and costs are analyzed over 30 years.

Summary and Implications

This study was only able to quantify selective primary and secondary benefits, and other benefits that are non-quantifiable were considered. Costs saved due to eliminating deaths are what actually drive the costs of the landmines.

The data and analysis indicate that demining is not an appropriate subject for benefit and cost study. Although costs have come early, which is typical for B/C analysis, benefits only exceed costs in two situations. Using the present value methods of comparing future costs and benefits (primary and secondary) i.e., lives and injuries of HN personnel indicates that benefits do not exceed costs in either country regardless of the discount rate or years in operation (one to 30 years). Benefits do not exceed costs in Ethiopia and Eritrea at any point in this study. In terms of benefits and costs, the U.S. demining program should not expect benefits to exceed costs within 30 years. However, if human lives and quality of life are to be taken seriously, this humanitarian benefit should be enough for the United States to contribute a demining program to these countries. In terms of these lives, something should be done in order to prevent the potential loss of life and limb. The following table lists the benefits and costs of the U.S./HN demining program.

The non-quantifiable benefits for the United States appear to vastly outweigh the costs (\$6 million) of the demining program. For the HN, quantifiable and non-quantifiable benefits far outweigh the costs, especially if one takes into account the primary and secondary benefits of Ethiopia.

For a demining operation, one could determine the winners and losers. Losers of the program could include the American taxpayer, if one were to just count the U.S. quantifiable benefits. If one were to take into account the U.S. non-quantifiable

Ethiopia Net Benefits

(76 lives x \$528 = \$40,128 for FY97)

10 Years	3%	5%	10%
Primary Benefits	\$348,547	\$315,838	\$252,517
Secondary Benefits	\$2,213,981	\$2,001,284	\$1,108,542
Total Benefits	\$2,562,528	\$2,317,122	\$1,361,059
Total Costs	\$6,089,000	\$6,089,000	\$6,089,000
Net Benefits	(\$3,526,472)	(\$3,771,878)	(\$4,727,941)
15 Years			
Primary Benefits	\$485,314	\$422,786	\$311,258
Secondary Benefits	\$3,104,239	\$2,686,354	\$1,970,982
Total Benefits	\$3,589,553	\$3,109,140	\$2,282,240
Total Costs	\$6,089,000	\$6,089,000	\$6,089,000
Net Benefits	(\$2,499,447)	(\$2,979,860)	(\$3,806,760)
20 Years			
Primary Benefits	\$603,697	\$506,501	\$347,809
Secondary Benefits	\$3,860,107	\$3,226,555	\$2,208,038
Total Benefits	\$4,463,804	\$3,733,056	\$2,555,847
Total Costs	\$6,089,000	\$6,089,000	\$6,089,000
Net Benefits	(\$1,625,196)	(\$2,355,944)	(\$3,533,153)
25 Years			
Primary Benefits	\$705,977	\$572,082	\$370,469
Secondary Benefits	\$4,512,122	\$3,655,232	\$2,362,155
Total Benefits	\$5,218,099	\$4,227,314	\$2,732,624
Total Costs	\$6,089,000	\$6,089,000	\$6,089,000
Net Benefits	(\$870,901)	(\$1,861,686)	(\$3,356,376)
30 Years			
Primary Benefits	\$793,972	\$623,430	\$384,536
Secondary Benefits	\$5,082,090	\$3,988,775	\$2,444,820
Total Benefits	\$5,876,062	\$4,612,205	\$2,829,356
Total Costs	\$6,089,000	\$6,089,000	\$6,089,000
Net Benefits	(\$212,938)	(\$1,476,795)	(\$3,259,644)

Eritrea Net Benefits

(10 lives x \$622 = \$6,220 for FY97)

10 Years	3%	5%	10%
Primary Benefits	\$55,530	\$50,460	\$40,892
Secondary Benefits	\$443,704	\$401,499	\$319,864
Total Benefits	\$499,234	\$451,959	\$360,756
Total Costs	\$6,005,000	\$6,005,000	\$6,005,000
Net Benefits	(\$5,505,766)	(\$5,553,041)	(\$5,644,244)
15 Years			
Primary Benefits	\$76,808	\$67,040	\$49,995
Secondary Benefits	\$621,401	\$539,773	\$395,943
Total Benefits	\$698,209	\$606,813	\$445,938
Total Costs	\$6,005,000	\$6,005,000	\$6,005,000
Net Benefits	(\$5,306,791)	(\$5,398,187)	(\$5,559,062)
20 Years			
Primary Benefits	\$95,131	\$80,015	\$55,658
Secondary Benefits	\$774,116	\$648,058	\$443,148
Total Benefits	\$869,247	\$728,073	\$498,806
Total Costs	\$6,005,000	\$6,005,000	\$6,005,000
Net Benefits	(\$5,135,753)	(\$5,276,927)	(\$5,506,194)
25 Years			
Primary Benefits	\$110,928	\$88,842	\$59,168
Secondary Benefits	\$905,729	\$733,018	\$473,124
Total Benefits	\$1,016,657	\$821,860	\$532,292
Total Costs	\$6,005,000	\$6,005,000	\$6,005,000
Net Benefits	(\$4,988,343)	(\$5,183,140)	(\$5,472,708)
30 Years			
Primary Benefits	\$124,566	\$98,136	\$61,347
Secondary Benefits	\$1,019,568	\$799,103	\$490,898
Total Benefits	\$1,144,134	\$897,239	\$552,245
Total Costs	\$6,005,000	\$6,005,000	\$6,005,000
Net Benefits	(\$4,860,866)	(\$5,107,761)	(\$5,482,755)

tifiable benefits, the American taxpayer would be a winner (see above list). The United States may eventually be able to gain many of these benefits while only supporting the start-up of the program.

One unforeseen benefit from American assistance to Ethiopia was support from the country at a crucial time when U.S. vital interests were at stake. After the United States supported communist Ethiopia during their devastating

droughts in the 1980s, Ethiopia in turn voted for a critical American resolution in the UN Security Council to support a military build-up after the invasion of Kuwait by Iraq in 1990.

"Ethiopia's greatest potential to improve their country economically is through the promise of agricultural development because of the fertile soil and rainfall. It accounts for 47 percent of the Gross Domestic Product (GDP) and is

the most important sector of the economy."¹⁶ Agricultural development has been potentially expanded to regions that were demined. Mine incidents have significantly decreased with the local herdsman and farmers, which has contributed to the successes of the nations as a result of the U.S. demining program according to MSG Bartholomew and MSG Johnson.¹⁷ However, there is as yet no data to support that assertion by these two individuals who played a large part in setting up the demining program in both countries.

Other benefits, in terms of the U.S. demining programs' original goals and objectives are listed below.¹⁸

(1) Enabling the United States to make a tangible difference to people struggling to rebuild their lives after long years of war: The DoD has provided U.S. trainers who have trained the Ethiopians and Eritreans in demining, public awareness and historical research. Since 1993, the U.S. demining program has produced more tangible benefits in Ethiopia than in Eritrea, i.e., 325,625 mines eliminated and 15,102 acres cleared in Ethiopia versus 4,750 mines destroyed and 645 acres cleared in Eritrea. In Ethiopia, 285 roadways have been cleared, versus 35 in Eritrea. U.S. trainers also provided humanitarian donations in vehicles (more than 120) for both countries and medical aid packages (medical, equipment-related and ambulatory). They also assisted in creating a demining infrastructure by supporting the construction and renovation of 11 facilities. The United States has helped to conduct emergency medical care in hospitals and implemented new surgical techniques for injuries as a result of landmines, in addition to supplying mine detection devices, public awareness training, historical research and demining training. U.S. demining may also help to redistribute some wealth from the United States to the Ethiopian government. For example, some costs have been inflated for some services to get Ethiopian participation, such as the costs of contracting the transportation for the demining equipment, which totaled \$12,000. The U.S. government has also led support including coordination for donations provided by other countries

and other organizations.^{17,19} In addition, the United States has helped governments such as Ethiopia and Eritrea help themselves by educating civilians on the damages and locations of landmines, and by providing badly needed humanitarian support to these war-torn countries. These benefits are manifest, tangible, quantifiable achievements. If implemented, the primary and secondary benefits, as listed in this article, can make a real difference in the lives of the common people of Ethiopia.

(2) Promoting stability by enabling countries to better solve their problems, rebuild their economies and build public confidence in their governments by meeting the needs of the people. Demining programs do not produce a panacea. Today, Ethiopia appears to be stable within its own borders, but the U.S. demining program has not directly produced stability between Ethiopia and Eritrea in terms of preventing these countries from fighting one another. From May 1998 to June 2000, fighting broke out along a disputed border area of these two countries. The United States estimated that between 50,000 and 100,000 soldiers died, with both countries using valuable resources to buy military hardware to fight each other.²⁰

Some other potential benefits that have been lauded have been regional stability, promotion of democracy and economic development.²¹ With the fighting occurring in the Horn of Africa between Ethiopia and Eritrea, regional stability has not been a benefit, although demining has helped to limit the accessibility of mines that were destroyed to these countries' arsenals. In regards to promoting democracy, Ethiopian citizens have been repressed, and some have actually been tortured after being arrested.^{15, 22} However, some inroads have been made toward democracy. When Ethiopia claimed victory in May of 2000, it came ahead of general elections scheduled on May 14, only the second general election in the country's history. An estimated 20 million registered voters chose members of the 548-seat federal parliament, nine regional assemblies, and two city councils.^{23, 24}

This study has shown that Ethiopia has misused vehicles for purposes other

than demining, their original intended use; in addition, an American renovated headquarters in Ethiopia is being used as a military academy. Agriculture, grazing and forestry development may also be expanded as a result of demining for both countries, although no data exists as to whether this land is being productively used.

(3) Strengthening U.S. relations with these governments at a critical time in which the governments are engaged in nation-building. There is no way of knowing whether the access and trust gained from the demining programs directly produced conflict resolution in the case of Ethiopia and Eritrea during their recent war. Although the U.S. government was unable to stop both sides from fighting one another in the early part of the conflict, it did help to persuade both sides to negotiate an end to the conflict in June of 2000. Such international organizations as the European Union and the Organization of African Unity as well as UN Secretary Kofi Annan appear to have had little influence in the recent conflict.²⁵ A question remains as to the degree of American influence with Ethiopia and Eritrea.

(4) Providing a valuable example to these countries of how a military can promote the public good rather than just wage war and oppress people. As mentioned above, the demining program is promoting public good and has shown its citizens that the military can be used for other purposes than oppressing its own people, although some of the resources, as noted earlier in this article, have been used for other purposes. Some critics are also alarmed that foreign governments, such as the United States, donate hundreds of millions of dollars in aid, despite mounting allegations of human rights violations.²⁶

(5) Providing an invaluable training benefit to U.S. troops, giving them experience in relating to diverse cultures, organizing programs in sparse, foreign environments and honing foreign language skills. Readiness is supposed to be enhanced with units and personnel exercising joint and inter-service operations, and critical wartime skills are practiced. However, some of the military chiefs have questioned whether readiness has actu-

ally been enhanced as a result of the numerous deployments, which have resulted in less training for service personnel. Winslow Wheeler, a defense analyst "...found evidence of extremely serious Army-wide personnel and training problems. The Senate Budget Committee appeared primed to join the critics of the administration who say the Pentagon robs readiness accounts to pay for peacekeeping operations. An internal report by the panel's senior defense analyst has concluded that Army readiness at its two major state-side combat training centers is inadequate and could become even worse...."²⁷

This study has found that this may be true for peacekeeping operations, but not for the humanitarian demining operations, which consist of Special Operation Forces (SOF). Initially, U.S. Special Operation soldiers²⁸ gained access and experience, but this was generally during the period of building its demining infrastructure, while training the Ethiopian soldiers how to train their own personnel. Since then, only a few liaison officers have gained that experience. SOF soldiers have continued to train in-country, but on other soldier tasks (i.e., infantry skills) as well. A demining program could only consist of a few months, deployment for these elite personnel, who would train the host nationals.

(6) Generally increasing morale among U.S. troops while enabling them to engage in activities with measurable benefits that are greatly appreciated by the host population. Morale among U.S. troops has not been surveyed.

Conclusion

In sum, there is normally a lack of competition for a public good, especially a purely public good, such as a demining program. Competition is necessary to prevent market failure (and non-market failure). Sustained competition in demining operations from the initial implementation by the United States to the sustainment by UN forces and NGOs, with cooperation from HN demining programs should produce this essential public good of demining. The long term winners from demining operations are the HN people and their government;

Benefits and Costs of U.S. Demining Programs in Ethiopia and Eritrea

U.S. QUANTIFIABLE BENEFITS

None

U.S. NON-QUANTIFIABLE BENEFITS

Creating intangible moral, humanitarian benefits
Promote regional and country stability in HN
Creates friendly countries amicable to U.S. interests
HN more supportive to U.S. interests
Strengthens relations with HN
Attainment of U.S. foreign policy objectives
Access to foreign bases and transport facilities
Provide example of how military can promote good
Provides military access to DoD
Provides political access to DOS
Creates intelligence gathering
Provides Commanders-in-chief with peace-time means of achieving goals
Provide training benefit to Special Operations Forces
Increases morale among U.S. troops
Provides humanitarian support to war-torn HN
Benefits U.S. demining companies
Boosts mine clearing U.S. technologies
Enhanced public relations with international community
Enhanced foreign policy in public relations and good will
Access to regional transportation
Agriculture benefits (importation of HN goods)

HN QUANTIFIABLE BENEFITS

Ethiopia: 292,791 landmines destroyed
Eritrea: 2,852 landmines destroyed
For both Ethiopia/Eritrea: 500,000 potential lives saved
76 lives saved per year for Ethiopia
10 lives saved for Eritrea
44 injuries saved per year in Ethiopia
20 injuries saved for Eritrea
1,478 livestock saved per year for Ethiopia
6 for Eritrea
For both Ethiopia/Eritrea: 11 facilities constructed and renovated 120 vehicles for demining
15,102 acres cleared for Ethiopia
645 acres cleared in Eritrea
282 km of infrastructure cleared in Ethiopia
35 cleared in Eritrea
97 Trainers trained in demining, public awareness, and historical research, and 356 HN personnel trained
\$12,000 influx of U.S. dollars in local economy

HN NON-QUANTIFIABLE BENEFITS

Contribute toward stabilization in HN
Coordination for donations provided by other countries and U.S. organizations
Active employment of soldiers for peaceful means
Assistance with infrastructure development
Increase of prestige and security from U.S. alliances
Potential increases the rate of repatriation of refugees
Reduce unemployment increases (costs)
Donations of medical aid packages

U.S. QUANTIFIABLE COSTS

None

U.S. NON-QUANTIFIABLE COSTS

Threatens readiness for some troops

HN QUANTIFIABLE COSTS

Data not available

HN NON-QUANTIFIABLE COSTS

Potential loss of sovereignty

the short-term losers are those who fund the program, especially paying out the capital expenses, i.e., American taxpayers. But the United States will also benefit in the longterm as the projected non-quantifiable benefits indicate. ■

Endnotes

1. Quade, E.S. 1989. *Analysis for Public Decisions*. 3rd Ed. Englewood Cliffs, N.J.: Prentice Hall.
2. The ICR database currently includes AP victims from some of the provinces and regions of Cambodia, Afghanistan, South Sudan, Angola, Somalia, Ethiopia, Eritrea, Rwanda, Lebanon, northern Iraq, Yemen and Burundi. Demographic data was not broken down by these countries, nor would the International Red Cross in Geneva release the data for this study.
3. During the early 1990s, Eritrea had implemented its own demining program, which eliminated thousands of mines at a steep cost of deminers. The precise figures of number of mines and injuries and deaths of deminers were not available to this study.
4. An official with DoD's Humanitarian Demining believes that payments made by the HN's Ministry of Defense to their deminers are most likely the same fee as other military personnel (Dudley 1998).
5. Primary benefits will include savings on deaths and injuries of HN individuals.
6. Victims of AP mines who survive injury and treatment are usually left with severe disability, which can lead to unemployment, divorce, poor prospects for marriage and being ostracized. All such situations have been witnessed but have not been quantified (Coupland 1995).
7. Coupland, R.M. 1996. "The Effects of Weapons: Surgical Challenge and Medical Dilemma." *The Royal College of Surgeons of Edinburgh*.
8. Gramlich, Edward M. 1990. *A Guide to Benefit-Cost Analysis*. 2nd Ed., Englewood Cliffs, N.J.: Prentice Hall.
9. Quade, Gramlich, etc., have emphasized in their respective books that benefits may be very difficult to quantify but that analysts should quantify what they can.
10. Some anecdotal benefits cannot be quantified but are significant. For example, in Ethiopia, landmines killed a CARE employee in the early 1990s, preventing the CARE staff from undertaking further relief and development work. "At various times, particularly in 1991 and 1992, we had to suspend major parts of the program for varying lengths of time because of mines or threats of mines on the main roads and secondary roads leading to our project areas" (Internet on Ethiopia, 1998).

11. Data is taken from four different sources: The demining headquarters in the HN, the Ethiopian Ministry of Defense, DoD Humanitarian Demining and Special Operations Command Central, MacDill Air Force Base, Tampa, Florida.

12. Hidden Killers (1994) states that Ethiopia's 500,000 landmines are causing between five and 10 casualties per week or 60,120 per year. The data from FY97 falls within this range.

13. Roberts, Shawn, and Jody Williams. 1995. *After the Guns Fall Silent: The Enduring Legacy of Landmines*. Washington, D.C.: Vietnam Veterans of America Foundations.

14. International Committee of the Red Cross. 1995. "Landmines Must Be Stopped - The Worldwide Epidemic of Landmine Injuries" (September). Washington, D.C.

15. Alemu, Amy. 1999. Telephone interview, Dallas, Texas (January).

16. U.S. Department of State (DOS). 1995. "Soldier Guide for Ethiopia and Eritrea" (February). Washington, D.C.

17. Bartholomew, Robert, and John Johnson. 1997. Personal interview, Special Operations Command, MacDill Air Force Base, Tampa, Fla. (September).

18. Report to Congress on Implementation of Sec. 306 of the National Defense Authorization Act for FY94.

19. The U.S. Army has discovered in 1996 that Ethiopia had mispent some of its demining resources, i.e., turned the Demining Headquarters into a military academy and used vehicles intended for demining for other military purposes.

20. The Washington Post reported that both countries have mispent their resources acquiring modern military hardware (WP 1999). It has been reported that the Ethiopian and Eritrean governments have purchased from the Russian government high-tech Sukhoi-27s along with package deals that included mechanics, trainers and perhaps even pilots (US News and World Report 1999).

21. Since taking power the new government has revived the economy of this East African nation of 60 million people, most of whom make about twenty-five cents a day. Ethiopia has enjoyed five to seven percent economic growth rates since the early 1990s. The government has privatized 190 state-run enterprises. Private investment has tripled since 1994, and 120 American investors now do business.

22. Buckley states that opposition leader Kengaymach Behele believes that any assistance given to the present government is wrong. Beyene Petros, a prominent opposition politician, argues the regime allows just enough freedom to keep major donors quiet. Some critics have become alarmed that foreign governments shower Ethiopia annually with hundreds of millions of dollars in aid, even though there are mounting allegations of human rights violations (Buckley 1998).

23. Associated Press. 2000. "Ethiopia Claims a Victory in Eritrean War." *Washington Post* (14 May).

24. Amy Alemu, a recent emigre to the United States from Ethiopia, claims that "The current government pretends to be democratic. It has kept the officials from the Mengistu government in jail, and it wants people to believe it is becoming more democratic" (Alemu 1999).

25. Vick, Karl. 1999. "Old Tactics, New Arms, Lethal Result." *Washington Post* (21 March).

26. The current Meles regime is alleged to have committed many human rights violations since it took power in 1991. The government has arrested thousands of critics and opponents. It has detained more journalists in the past three years than any other African government. Two years ago, the International Committee of the Red Cross estimated that 10,000 Ethiopians were in prison for political or national security reasons (Buckley 1998).

27. Weible, Jack. 1998. "Congress to consider whether Pentagon robs military readiness to pay for peacekeeping efforts." *Army Times* (12 January).

28. Special Operations include soldiers who serve in Special Forces, Civil Affairs, Psychological Operations and other branches involving logistics.

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