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# Be Fruitful, and Multiply, and Replenish the Earth, and Subdue It: Third World Population Growth and the Environment

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# ARTICLES

## **Be Fruitful, and Multiply, and Replenish the Earth, and Subdue It: Third World Population Growth and the Environment**

OMAR SALEEM\*

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World population growth might be portrayed through the popular fable of the man who purportedly invented the game of chess. In the fable, the man did a favor for a king who, in turn, offered him a reward. The man asked the king for the amount of wheat obtainable by beginning with one grain on the initial square of a chess board and doubling the amount of wheat on each succeeding square.<sup>1</sup> The results depicted that by the 64th square the doubling power of exponential growth entitled the man to more than 500 times the 1976 worldwide harvest of wheat.<sup>2</sup> This mathematical expression of exponential growth describes the constant increase of a variable over time.<sup>3</sup> Exponential growth applies to pollution, disease, resource use, and population growth.<sup>4</sup> The phenomenon of exponential growth demonstrates that if a population increases by a mere one percent per year that it would nonetheless double in seventy years. The doubling time of a population at an annual growth rate is ascertained by dividing 70 by the growth percentage rate. For example, if the growth percentage rate is two percent, then  $D = 70 \div 2$  or thirty-five years.<sup>5</sup> A population with a two percent annual growth rate would therefore double in thirty-five years. A cursory review of the world population growth in the specific years in the billions depicts the explosive nature of exponential growth: 2.5 billion (1950), 5.3 billion (1990), 6.3 billion (2000) and 8.5 billion (2025).<sup>6</sup>

The proclaimed corollary of population growth is environmental degradation and deterioration. U.S. Vice President Albert Gore stated, “[B]y quadrupling [world population] in the space of a single lifetime . . . [we] dramatically increase our vulnerability to the extreme climate changes that

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1. David Suzuki, *Only In This Century Has Growth Become Part Of Life*, THE GAZETTE (Montreal), July 20, 1991, at J8.

2. *Id.*; see also K.C. Cold, *Doubling On and On and On*, WASH. POST, Feb. 21, 1981 (Magazine), at J8.

3. See David Suzuki, *Fate Of Our Species Now Being Decided; Current Rate Of Consumption Must Be Cut If We Are To Survive*, THE GAZETTE (Montreal), July 27, 1991 at J8.

4. *Id.*; see also PAUL R. EHRLICH & ANNE H. EHRLICH, THE POPULATION EXPLOSION 15 (1990); PAUL R. EHRLICH, THE POPULATION BOMB 18 (1968).

5. D = doubling time and P = annual percentage growth rate. See *Know the Facts: The United State's Population and Environment Population-Environment*, BALANCE (Newsletter), Sept. 1993, at 2.

6. U.N. DEPT. OF INT'L ECONOMIC & SOCIAL AFFAIRS, WORLD POPULATION PROSPECTS 1990, at 22, U.N. Doc. St/ESA/Ser.A/120, U.N. Sales No. E.91.XIII.4. (1991).

we ourselves are now setting in motion.”<sup>7</sup> There is burgeoning concern about the adverse effects of Third World population growth on the natural environment. In the main, observers assert that population growth in third world countries must decrease, if not cease, in the interests of world survival, in a world of limited natural resources.<sup>8</sup> This article discusses Third World population growth and its impact on the natural environment. It explores why any solutions must include a consideration of technological transfer, race, religion, culture, economics, health care, AIDS, energy use and consumption, mutual sacrifice, viable alternatives, and population policies among countries.

Part I of this article outlines the history of population control efforts and population statistics. It further identifies the impact of world population on the natural environment and infrastructure of Third World nations. Part II then suggests that solutions to world population growth are not limited to comparable estimates and projects, but should take into consideration religious beliefs, the impact of patent laws, poor health care and conflicting messages within the international community. Part III discusses how any efforts to remedy environmental concerns in the Third World should integrate the relevant environmental concerns of Third World nations. Finally, Part IV summarizes the main conclusions reached in the paper.

## I. BACKGROUND

### A. POPULATION CONTROL — BACKGROUND DISCUSSION

Concerns and opinions about population growth are not novel. Biologists, clergy, economists, feminists, social activists, ecologists and human rights advocates have long ago expressed concerns about the consequences of population growth. These concerns have nurtured a fierce debate that has generated two diametrically opposite positions on the consequences of increased human population. One side, embraced by the “Cassandras,” perceives increased population as an additional mouth to feed. In their

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7. AL GORE, *EARTH IN THE BALANCE* 78 (1993). For example, if the current rate continues, Florida’s population of 13 million will reach 19 million by 2010. Jo Ann Quarrie, *Crowding Out Our Future*, SIERRA CLUB CAUSEWAYS (Newsletter for Dade and Monroe Counties), Mar. 1994, at 2. Between 1780 and 1980 Florida, along with other parts of the U.S., has suffered a loss of wetlands. Within that time, the United States lost more than half of its wetlands and its population grew from 4 million to 257 million. *Wetland Losses & Population Growth*, BALANCE DATA POPULATION-ENVIRONMENT BALANCE 1-2, Apr. 30, 1993. It is predicted that the increasing U.S. population will exacerbate problems such as air pollution, landfill capacity, urban boom, overcrowded school systems and extinction of species. *Awareness Week Catches the United States Unaware Population-Environment Balance Reports*, PR NEWswire SERVICES, Oct. 17, 1991.

8. Environmental impact is determined by three factors: population, consumption levels and technology.” U.N. POPULATION FUND, *THE STATE OF THE WORLD POPULATION 1994 CHOICES AND RESPONSIBILITIES*, at 5 [HEREINAFTER *STATE OF WORLD POPULATION*].

view, continued population growth can only lead to catastrophe.<sup>9</sup> The Rev. Thomas Robert Malthus, a Cassandra, proclaimed that the power of population growth was greater than the power of Earth to sustain humans.<sup>10</sup> In his view, the food supply fails to grow as quickly as the population and mass starvation is inevitable. According to Malthus, population increases geometrically and subsistence increases arithmetically.<sup>11</sup> In the late 1700s, Malthus' scholarship was instrumental in formulating the European response to a growing population. Europe established overseas colonies. Centuries later, in the 1950s, Monsignor Irving A. De Blanc, in an effort to condemn birth control as a means to deal with a growing population, advocated shipping the "excess" population to outer-space extraterrestrial colonies.<sup>12</sup>

The opposing position, held by the "Pollyannas," asserts that the problems associated with population growth seldom materialize and any problem created will ultimately be resolved.<sup>13</sup> Humans are perceived as flexible and adaptable and any calamity associated with population growth can be averted by economic ingenuity. Economist William Pety asserted in 1680 that people are a fundamentally precious commodity: more people constituted more laborers for a work force that led to economic development.<sup>14</sup> In 1732, Bernard Mandeville stated that "the never-failing Nursery of Fleets and Armies is a high population growth rate."<sup>15</sup> He perceived a large population as vital for warfare and national security.

The issue of population growth was an intrinsic part of the early women's rights movement. Margaret Sanger advanced the use of birth control and organized the 1925 World Population Conference in Geneva to address the

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9. Charles C. Mann, *How Many Is Too Many?*, 27 THE ATLANTIC 48 (Feb. 1993).

10. *Id.* at 49.

11. Barbara Duden, *Population*, in THE DEVELOPMENT DICTIONARY: A GUIDE TO KNOWLEDGE AS POWER 147 (Wolfgang Sachs ed., 1993). Malthus failed to take into account that agricultural practices would progress, genetic strains would be produced, and crops would yield more. For example, in the United States between 1930 and 1975, the use of genetics to improve strains and render them more resistant to disease created an increase in wheat, rice, peanuts, soybeans, cotton, and potatoes. NEIL MIDDLETON, ET AL., TEARS OF THE CROCODILE FROM RIO TO REALITY IN THE DEVELOPING WORLD 58 (1993). Experts agree there is no shortage of food, and with equitable distribution there is sufficient food for the foreseeable future. In fact, lack of purchasing power rather than food shortage is the primary cause of malnourishment. STATE OF WORLD POPULATION, *supra* note 8, at 6.

12. GARRET HARDIN, LIVING WITH LIMITS 7 (1993).

13. Mann, *supra* note 9, at 50.

14. *Id.* at 49. This perception of people as a precious commodity enabled some in the United States to condone slavery because it provided a free work force. The interests in protecting slaves as a commodity created what is commonly known as group life insurance. ROBERT H. JERRY, II UNDERSTANDING INSURANCE LAW 627 (1987). "Slave traders named themselves the beneficiaries under insurance on the lives of shiploads of slaves transported from Africa to America." 43 COUCH, ENCYCLOPEDIA OF INSURANCE LAW § 263 (1982).

15. Mann, *supra* note 9, at 47.

issue of population growth.<sup>16</sup> She encountered opposition from both the Marxists and the Catholic Church. Critics asserted that her advocacy for birth control among people of color was motivated by racism; it called for their sterilization.<sup>17</sup> She wrote that, "we want to exterminate the Negro population and the minister is the man who can straighten out that idea if it ever occurs to any of their more rebellious members."<sup>18</sup>

In 1962, the United Nations General Assembly passed a resolution on Population Growth and Economic Development. Later, in 1967, a special trust fund was created by the United Nations Fund for Population Activities (UNFPA). However, in 1984, the United States refused to fund UNFPA because of abortion practices in China. The United States later reversed this position under the Clinton Administration.<sup>19</sup> The United Nations Conference on Environment and Development (UNCED) held in Rio de Janeiro in 1992 and the International Conference on Population and Development in Cairo in 1994 were the world's attempts to address the issue of population growth effects on the global environment.<sup>20</sup>

## B. POPULATION STATISTICS

World population was two billion in 1920. It climbed to three billion in 1960. In 1975, it reached four billion, five billion in 1987 and remained at five billion in 1993.

Current prediction and trends indicate world population growth will reach 6.3 billion in the year 2000, 8.5 billion in 2025, 10.0 billion in 2050, 10.8 billion in 2075, 11.2 billion in 2100, 11.4 billion in 2125 and 11.5 billion in 2150.<sup>21</sup>

16. Elizabeth Rohrbough, *On Our Way to Ten Billion Human Beings: A Comment on Sustainability and Population*, 9 COLO. J. INT'L ENVTL. L. AND POL'Y 235, 240 (1994).

17. ANGELA Y. DAVIS, *WOMEN, RACE AND CLASS* 214 (1981). For a discussion on the interrelationship between race and the reproductive rights of women, see generally Dorothy E. Roberts, *Punishing Drug Addicts Who Have Babies: Women of Color, Equality, and Right of Privacy*, 104 HARV. L. REV. 1419 (1991); The intersection of race and reproductive rights is illustrated in a comment by a Michigan probate judge. Michigan law requires minors seeking an abortion to acquire judicial consent if the minor seeks an abortion without parental consent. The judge expressed his reluctance in authorizing an abortion except in cases of incest or when a white girl is raped by a black man. See T. Alexander Aleinikoff, *The Constitution in Context: The Continuing Significance of Racism*, 63 U. COLO. L. REV. 325, 332 (1992).

18. DAVIS, *supra* note 17, at 215. The interplay of race and population was also prevalent in the establishment and perpetuation of Indian reservations. See RICHARD J. PERRY, *APACHE RESERVATION* 4 (1993).

19. Rohrbough, *supra* note 16, at 240-42.

20. United Nations conferences on population growth have been held every 10 years for the past 30 years. Within that time world population increased by two billion people. See Barbara Crossette, *U.N. Meeting Facing Angry Debate on Population*, N.Y. TIMES, Sept. 4, 1994, at A1.

21. U.N. DEPT. OF INT'L ECONOMIC & SOCIAL AFFAIRS, *LONG RANGE WORLD POPULATION PROJECTIONS TWO CENTURIES OF POPULATION GROWTH 1950-2150*, at 22, U.N. Doc. ST/ESA/SER.A/125, U.N. Sales No. E.92.XIII.3.

The Third-World<sup>22</sup> countries in general, and the African continent in particular, have the largest current and projected growth in population.<sup>23</sup>

PERCENTAGE DISTRIBUTION OF WORLD POPULATION 1950, 1990, AND 2025

	1950	1990	2025
Africa	8.8	12.1	18.8
Latin America	6.6	8.5	8.9
Asia	54.7	58.8	57.7
China	22.1	21.5	17.8
India	14.2	16.1	17.0
Other Asia	18.4	21.2	23.0
North America	6.6	5.2	3.9
Europe	15.6	9.4	6.1
Oceania	0.5	0.5	0.5
USSR	7.2	5.4	4.1 <sup>24</sup>

Third World population growth rate is due to two factors. First, the mortality rate has declined due to improved public health and improved

22. The term 'Third World' refers to countries in Asia, Africa, Latin American, and the Middle East. "The emphasis of Alfred Sury when he coined the term was on the exclusion and aspiration of the Third World. His article concludes: 'The Third World has, like the Third Estate, been ignored and despised and it too wants to be something.' Sauvy saw the Third World (*Tiers Monde*) as a modern parallel to the Third Estate (*Tiers État*) of the French Revolution — the class of commoners. In this way, Sauvy's term carries not only the connotation of exclusion from power but also, especially from a French writer, the idea of revolutionary potential." See KOFI BUENOR HADGOR, *DICTIONARY OF THIRD WORLD TERMS* 3 (1992). Third World countries embrace diverse economic, political, and social agenda. In fact, such agendas can conflict. For example, despite Chinese-Communist rhetoric of a United "Afro-Asian" world in the 1960s, China covertly traded with South Africa. ROSS TERRIL, *CHINA IN OUR TIME* 35-40 (1992). Since the 1960s, there have been numerous racial clashes between African and Chinese students in China. Such clashes have adversely affected trade relations between China and Africa. Barry Sautman, *Anti-Black Racism in Post-Mao China*, 138 *CHINA Q.* 413 (1994). Furthermore, the term Third World has become increasingly economically diverse due to the collapse of the Soviet Union, oil-rich Arab states, poverty stricken African countries, and the rapid economic growth in certain parts of Asia. See LILLIAN CRAIG HARRIS, *CHINA'S FOREIGN POLICY TOWARD THE THIRD WORLD*, *The Wash. Papers*/112 Vol. XII (1985).

23. Paul Kennedy, *The Perils of Over Population*, *MIAMI HERALD*, July 31, 1994, at 1M; *World Population to Double by Year, 2030*, *GHANIAN TIMES*, Aug. 5, 1994. Africa will experience the largest population growth followed by Central and South America, Asia, Oceania, North America, and Europe. The five fastest growing countries in the world will be Oman, Niger, Yemen, Ethiopia, and Angola. Jay D. Hair, *Business and Environment: The Expanding Dialogue*, 15 *ENVTL. L.* 745, 746 (1985).

24. U.N. DEPT. OF INT'L ECONOMIC & SOCIAL AFFAIRS, *REVIEW AND APPRAISAL OF THE WORLD POPULATION PLAN OF ACTION 1989 REPORT*, U.N. DOC. ST/ESA/SER.A/115, Sale No. E.89. XIII. II.

food production. Second, pre-transition birth rates dating back to the 1950s, where Third World countries had aggregate birth rates of 45 per 1,000 compared to a rate of 30-35 per 1,000 in Western Europe, have not subsided.<sup>25</sup> Increased population resulted in a greater need for energy and food, increasing the demand on natural resource demands.<sup>26</sup> Third World countries face an increased population, which they are unable to feed.<sup>27</sup> By the year 2000, four out of five people will live in Third World countries.<sup>28</sup> Along with degradation of natural resources and destruction of the environment, population experts assert that the staggering population increase will cause economic stagnation, political instability, poverty, malnutrition, and civil conflict.<sup>29</sup>

Political instability and civil conflict in Rwanda<sup>30</sup> for example, are

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25. Christopher S. Wendel, *Curbing Rapid Population Growth: The Crux of Sustainable Development*, 17 FLETCHER FOREIGN WORLD AFF. 167, 170 (1993).

26. FRANK GRAD, ENVIRONMENTAL LAW § 1.02 (1985); Dennis J. O'Donnell, *Resource Scarcity and Population Growth: International Planning and Environment Imperatives*, in INTERNATIONAL DIMENSIONS OF THE ENVIRONMENTAL CRISIS 217 (Richard N. Barrett ed., 1982).

27. Nancy Birdsall, *Population Growth and Poverty in the Developing World*, 35 POPULATION BULL. 9 (1980) (examining the link between rapid population growth and poverty and posits such growth creates more poverty). In sub-Saharan Africa, poverty increased at the same rate of population growth: the poor became poorer. 143 THE COURIER (Magazine), Jan.-Feb. 1994.

28. *Development is Undercut by Growth*, POPLINE, Mar.-Apr. 1994, at 2. Third World population growth will have an profound impact on language. Languages based upon the number of speakers rank as follows: Chinese, English, Russian, Spanish, Hindi, Portuguese, German, Japanese, Bengali, Arabic, and French. The number of Francophones world-wide is estimated at 100 million: 55 million in France, 10 million in Europe, and the remainder in Africa, Asia, North America. By the year 2000, the majority of French speakers will reside in Africa. ADRIAN BATTYE & MARIE-ANNE HINTZE, *THE FRENCH LANGUAGE TODAY* 1-2 (1992). The French language has been synonymous with France and the words Paris, Marseille, Sorbonne, Pigalle, and persons such as Montesquieu, Rousseau, and Voltaire. See FRANTZ FANON, *BLACK SKINS, WHITE MASKS* 23 (1967). In an attempt to prevent "cultural encroachment" and assume "responsibility" for the French language, France's Culture Minister proposed legislation in early 1994 that would protect the French language. According to the proposed legislation "all advertising, contracts, job offers, internal regulations, official memos, any public document and all scientific meetings and colloquiums must be purged of foreign terms. . . ." Sharon Waxman, *Pride Or Prejudice? French Official Rallies Against Franglais*, MIAMI HERALD, Feb. 27, 1994, at 10A. Such efforts by the French also occurred in the years 1635, 1966 and 1975, respectively. *Id.*; see also Marlise Simons, *Bar English? French Bicker on Barricades*, N.Y. TIMES, Mar. 15, 1994, at A1. The impact of population on language is evident in the United States. In 1980, the U.S. Census Bureau reported the Hispanic population as 14.6 million. Between 1980 and 1985 the Hispanic population grew by 20 % in contrast with the general U.S. population growth of 3.3%. In 1990, Hispanics constituted half of all people in the United States for whom English was a foreign language. By 1993, the Census Bureau reported 21.7 million Americans spoke Spanish at home. And, recent statistics indicate that Spanish is the most common language. See Martha M. Hamilton, *New Dispute Erupts Over Sale of Spanish-Language T.V. Stations; Critics Say Deal Should Have Included Hispanic Americans*, WASH. POST, Sept. 21, 1986, at D3. (stating that the figures concerning the Hispanic American population are considerably larger if illegal and other immigrants are included).

29. POPLINE, *supra* note 28, at 1.

30. See William E. Schmidt, *Rwanda Rebels Reported Closing in on Capital*, N.Y. TIMES, Apr. 12, 1994, at A6.



purportedly due in part to rapid population growth. Rwanda is the most densely populated country in Africa.<sup>31</sup> In Rwanda, women have an average of 8.5 children, compared with 2.1 in the United States and Sweden, 6.4 in Saudi Arabia, 4.6 in Bolivia and Mongolia, 1.5 in Germany, 1.4 in Hong Kong, and 1.3 in Italy.<sup>32</sup> As the population grows, poverty worsens and the infrastructure is unable to sustain itself. The resulting hunger and ethnic strife create a strain on the society.

Haiti also has a legacy of poverty and environmental degradation. Haiti has a population of seven million, growing at the rate of 2.3% or 160,000 people annually.<sup>33</sup> Its population density is among the world's highest and has been noted as a primary cause of the conflicts in Haiti.<sup>34</sup>

### C. POPULATION AND THE ENVIRONMENT

World population growth is a critical contributor to the emission of greenhouse gases.<sup>35</sup> There is a global concern about the increase of greenhouse gas emissions into the atmosphere. Although, developed nations have historically contributed a disproportionate share of greenhouse gas emissions as a result of industrialization and income growth. However, the Third World is emitting an increasingly greater amount of greenhouse gases. Environmental experts predict that, in the near future, Third World countries will become the major contributors to global warming.

Population growth impacts global warming in several ways. First, an increasing population demands more power, energy, and transportation, resulting in the greater use of fossil fuels. Second, population growth causes deforestation<sup>36</sup> because the growth of Third World populations creates greater demands for agricultural products and wood for fuel.

A consequence of population growth in Africa is that urban areas are growing rapidly. The dramatic internal migration in Africa, without the necessary corresponding growth in infrastructure, creates within African cities low wages, unemployment, family breakdown, traffic jams, air

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31. RWANDA, *WORLD MARK ENCYCLOPEDIA OF THE NATIONS* 325, 326 (8th ed. 1991).

32. *POPLINE*, *supra* note 28, at 4.

33. Helen Klein, *Key to Solving Most of Problems in Haiti is Checking Population Growth*, *SUN-SENTINEL*, Sept. 30, 1994, at 19A.

34. *Id.*

35. NANCY BIRDSALL, *WORLD BANK ECONOMICS DEPARTMENT, WORKING PAPER NO. 1020: ANOTHER LOOK AT POPULATION AND GLOBAL WARMING 1* (1992) [hereinafter *WORLD BANK WORKING PAPER*].

36. Deforestation accounts for 1.4 billion tons of carbon emission per year compared to 5.6 billion tons resulting from fossil fuel burning. Deforestation is caused by clearing forest for agriculture, wood fuel and logging. *WORLD BANK WORKING PAPER*, *supra* note 35, at 15.

pollution, sewage problems, inadequate water supply, electrical blackouts, housing shortages and overcrowding.<sup>37</sup>

Urban growth, and its associated environmental problems, is not limited to Africa. The population of the ten largest urban areas has also increased between 1975 and 1990:

1975 (millions)		1990 (millions)	
1. Tokyo	16.4	1. Mexico City	20.2
2. New York	15.9	2. Tokyo	18.1
3. Mexico City	11.6	3. Sao Paulo	17.4
4. Shanghai	11.4	4. New York	16.2
5. Sao Paulo	9.9	5. Shanghai	13.4
6. Buenos Aires	9.1	6. Los Angeles	11.9
7. Los Angeles	8.9	7. Calcutta	11.8
8. Paris	8.6	8. Buenos Aires	11.5
9. Beijing	8.5	9. Bombay	11.2
10. London	8.2	10. Seoul	11.0 <sup>38</sup>

Increased production of greenhouse gases by Third World countries experiencing rapid population growth raises two questions. First, how much would feasible reductions in projected rates of population growth in the developing countries contribute to reductions in greenhouse gas emission? Second, what would be the cost of ensuring such reductions in population growth, relative to the cost of other options for reducing emissions?<sup>39</sup>

A reduction in Third World population growth would contribute relatively little to reducing greenhouse gases because: (1) the difference between a feasible reduced projection and an actual population projection is not that great; (2) the potential for affecting future population size is greatest in those Third World countries where per capita emissions are

37. S. Coulibaly, *A Review of the Consequences of Internal Migration*, in INTERNAL MIGRATION AND REGIONAL DEVELOPMENT IN AFRICA 136, 140-49 (Regional Inst. for Population Studies (RIPS) Research Monograph No. 2, 1985). High unemployment also creates other problems such as abandoned children. For example, in Ghana, while the birth rate for mature Ghanaians has decreased, the teenage birthrate is on the rise. The Ghanaian government expressed great concern because of the possibility that children will be abandoned by their teenage parents who lack skills, education, and employment. *Teenage Birthrate Shooting Up*, GHANAIAAN VOICE, Dec. 5-6, 1994.

38. U.N. DEP'T OF INT'L ECONOMIC & SOCIAL AFFAIRS, CONCISE REPORT ON THE WORLD POPULATION SITUATION IN 1991 WITH SPECIAL EMPHASIS ON AGE STRUCTURE at 26, U.N. Doc. ST/ESA/SER.A/124, U.N. Sales No.E.91.XIII.17 (1991). It is estimated that half of the Third World's population will live in urban areas by the end of the century. STATE OF WORLD POPULATION, *supra* note 8, at 8. Seventy percent of the urban population in Third World countries is exposed to unclean air. Charles R. Hadlock, *Multinational Corporations and the Transfer of Environmental Technology to Developing Countries* 6, in INT'L ENVTL. AFF. 149, 151 (1994).

39. WORLD BANK WORKING PAPER, *supra* note 35 at 1.

lowest; and (3) the possibility that for a given per capita income, a smaller population would produce higher per capita greenhouse gas emissions.<sup>40</sup>

Although reductions in population growth in Third World countries would have a *de minimus* impact on global warming, it is advocated that reducing the population of Third World countries is more cost effective than other options that reduce greenhouse emissions, such as carbon taxes.<sup>41</sup> Advocates compare the costs of a carbon tax with the costs of family planning and educating young women and conclude, "some combination of spending on family planning and girls' education in low income countries should be a central part of any optimal carbon reduction strategy."<sup>42</sup>

#### D. IMPACT OF AFRICAN TRADITIONAL RELIGIOUS BELIEFS ON THE ENVIRONMENT

Traditional religious beliefs also impact African environmental laws. Historically, bush fires have been used in Africa for hunting, farming and eliminating snakes. In 1981, Ghana enacted a Control of Bush Fire Law which provides: "1. Except as otherwise provided in section 2 of this law it shall be unlawful for any person to start a bush fire for any purpose whatsoever."<sup>43</sup>

The above provision is, by coincidence, environmentally sound. Forests are destroyed worldwide at a rate of eighty acres per minute.<sup>44</sup> Forest fires release one billion to two billion tons of carbon, which builds up greenhouse gas, into the atmosphere annually.<sup>45</sup> Desert-like conditions exist, where they had not before, because indiscriminate fires exacerbate the desertification process.<sup>46</sup> Desertification arises from water erosion, soil salinization, overgrazing, water-logging, and deforestation.<sup>47</sup> Deforestation is caused by climate changes, fires, landslides, agricultural practices such as shifting cultivation, commercial timber harvesting for export, logging for wood fuel, burning and over-grazing of livestock (which reduces soil productivity and

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40. *Id.* at 13-15.

41. *Id.* at 19.

42. *Id.* at 30.

43. Ghana Control of Bush Fire Law, 1983 P.N.D. C.L. 46 (1981).

44. Thomas Lovejoy, *Deforestation*, in 1992 EARTH J. 89.

45. *Id.*

46. REPORT OF THE UNITED NATIONS CONFERENCE ON DESERTIFICATION, U.N. Conference on Desertification, at 3, U.N. Doc. A/Conf.74/36 (1977) (defining desertification as the diminution or destruction of the biological potential of land and leading ultimately to desert-like conditions. It is an aspect of the widespread deterioration of ecosystem, and has diminished or destroyed the biological potential, i.e., plant and animal production, for multiple use purposes at a time when increased productivity is needed to support growing populations in quest of development.).

47. Michael M. Glants, *Desertification*, in 1992 EARTH JOURNAL 92.

natural regenerative capacity). Deforestation creates further environmental problems and has become an international concern.<sup>48</sup>

Sub-Saharan Africa lost 3.3 million hectares of forest and woodlands in the 1980s.<sup>49</sup> The Sahara Desert continues to grow southward because of climate change, the use of fire in agriculture, farming in marginal areas and population pressures.<sup>50</sup>

A study of Ghana's 1977 drought revealed:

Crop failure during 1976, 1977 [and 1980] was not caused so much by the lack of rain as by the lack of soil fertility, especially the low and fast decreasing soil organic matter. And the fast decreasing soil organic matter content is mainly the result of indiscriminate burning and neglect of the production and use of organic fertilizers.<sup>51</sup>

Despite the adverse impact of bush fires, the practice continues in Ghana due to long-term traditional practices and beliefs. Such beliefs impact the law and have become part of the Control of Bush Fire Law:

2.(1) It shall be lawful for any person to set fire for the purpose of burning farm slash or any grass, herbage or wood trees on a farm if the fire is controlled and confined within the boundaries of the farm and does not exceed the purpose for which the fire is permitted.<sup>52</sup>

Sections 1 and 2 of the Ghana Bush Fire Law are in conflict with each other. In effect, there is a prohibition on bush fires, yet fires are permitted if they are controlled. Traditional practices merged with government's

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48. Michael B. Saunders, *Valuation and International Regulation of Forest Ecosystems: Prospects for a Global Forest Agreement*, 66 WASH. L. REV. 871 (1991).

49. Thomas J. Goliber, *Population in Africa*, in *ENCYCLOPEDIA OF THE ENVIRONMENT* 570 (Ruth A. Eblen & William R. Eblen eds., 1994).

50. Fred W. Reed, *Human Ecology, Desertification, Nationalism, and Population Growth in the Sahara*, in *INTERNATIONAL DIMENSIONS OF THE ENVIRONMENTAL CRISIS* 229-33 (Richard N. Barrett ed., 1982). See also John M. Sanders et al., *Developing New Agricultural Technologies for the Sahelian Countries: The Burkina Faso Case*, 39 *ECON. DEV. AND CULTURAL CHANGE* 1 (1990). The destruction of farmland has a particularly adverse effect on women. Diminished supplies of fuelwood and water greatly increases women's workloads, jeopardizing their health. In addition, there is an adverse impact upon women's wage earnings and household dynamics. Anoya Wickramasinghe, *The Differential Impact of Deforestation and Environmental Degradation on Men and Women: Issues for Social Justice*, 5 *J. HUM. JUST.* 46 (1993). Loss of rangelands world-wide in a three percent drop in beef production because there was less grain to feed livestock. HAL KANE, *FULL HOUSE: REASSESSING THE EARTH'S POPULATION CARRYING CAPACITY* 94-95 (1994).

51. ALBIN KOREM, *BUSH FIRE AND AGRICULTURAL DEVELOPMENT IN GHANA* 188-89 (1985). Drought management should become a vital part of economic development management in Africa because droughts cause widespread recession. Droughts create unemployment in sectors which substantially rely upon the use of water such as construction, mining, and commercial agriculture. See Roger Hay, *Getting Drought on to the Policy Agenda*, *COURIER* 85, Jan.-Feb. 1994, at 85.

52. Control of Bush Fire Law, *supra* note 43, at 46. The Bush Fires Law was modified in 1990, but it essentially still allows for controlled burning of "any farm, forest or grassland." P.N.D.C.L. 229 (Ghana Bush Fire Law).

environmental concerns result in a virtually unenforceable statute. The statute allows bush fires, and these fires harm soil fertility, ecology, agricultural production, economic development and contribute to greenhouse gas emissions.

The impact of traditional religion on the environment is depicted in a letter by an African chief in Ghana to a local government official: "It [bush fires] is a customary festival celebrated annually by chiefs in our area[,] and failure or negligence to observe this honorable practice means an insult to the power of our gods and may even result in disaster in the village or clan concerned."<sup>53</sup> Bush fire laws in Ghana demonstrate that, despite national and international concerns, basic education about the environment must begin at the grass roots level. Farmers and villagers should be compensated for sound environmental practices, and school children should be taught about both traditional and "modern" environmental practices.

## II. CONSIDERATIONS OF POPULATION/ENVIRONMENTAL PROBLEMS

### A. THE ROLE OF RELIGION IN POPULATION GROWTH AND ENVIRONMENTAL PROBLEMS

Religion is a way of life. It shapes personal beliefs and world views. Religion is intrinsically intertwined with culture and functions to provide identity and norms.<sup>54</sup> Any discussion of population control, as a means to address environmental concerns, must acknowledge religious perspectives. In particular, there must be a study of how particular religions impact the natural environment, reproductive practices and belief systems in the Third World.

#### 1. Christianity

Worldwide Christian membership is estimated at 1,833,022,000:<sup>55</sup> approximately 327,204,000 in Africa, 285,365,000 in Asia and 435,811,000 in Latin America.<sup>56</sup> With such a tremendous population of Christians throughout

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53. KOREM, *supra* note 51, at 198.

54. DAVID C. LEEGE & LYMAN A. KELLSTEDT, *REDISCOVERING THE RELIGIOUS FACTOR IN AMERICAN POLITICS* (1993). For a discussion on how religion impacts the U.S. government and the U.S. Constitution, see JOHN EIDSMOE, *CHRISTIANITY AND THE CONSTITUTION* (1987).

55. *THE WORLD ALMANAC AND IN-DEPTH BOOK OF FACTS* 727 (Robert Famighetti et al. eds., 1994) [hereinafter *WORLD ALMANAC*]. For a discussion of the various forms of Christianity, see GEORGE A. MATHER & LARRY A. NICHOLS, *DICTIONARY OF CULTS, SECTS, RELIGIONS, AND THE OCCULT* 59 (1993).

56. *WORLD ALMANAC*, *supra* note 55, at 727. Among the number of Christians in Asia, only three percent profess Catholicism. *Pope Appeals to Beijing to Allow Church in China*, *ORLANDO SENTINEL*, Jan. 15, 1995, at A3.

the Third World, it behooves population control proponents and opponents to recognize the impact Christianity has on the environment and the related issue of reproductive rights.

In his discussion on the sources of human rights, Professor Louis Henkin indicates that the Bible fails to articulate any particular rights, but focuses more on duties.<sup>57</sup> Accordingly, humanity's primary duty is owed to God. "The traditional idea was not individual autonomy, freedom, privacy — but conformity to God's will and to divine law."<sup>58</sup> The will of God with respect to the relationship between humans and the natural environment was articulated as far back as Adam and Eve. In *Genesis*, God blessed Adam and Eve and said, "Be fruitful and multiply, and replenish the earth, and subdue it: and have dominion over the fish of the sea, and over the fowl of the air, and over every living thing that moved upon the earth."<sup>59</sup> Christian theology mandates that humans assume a stewardship over all natural creation.

In addition, humans are told to multiply. The Catholic Church dictates that both the duty and manner of family planning are rooted in religious obligation. It is the duty of Catholics to procreate, and it is sinful to hinder or obstruct fertility. The Church condemns abortion and other artificial means of contraception as a violation of the sacred principles of life. Limiting family size is permissible by observing the natural cycles in female reproduction (avoiding sexual intercourse during ovulation) or by chastity.<sup>60</sup> The impact of this family planning strategy adopted by the Church is seen in Guatemala. The population in Guatemala doubles every twenty-two years.<sup>61</sup> Because it is a predominately Catholic society, birth control is either unavailable or a social taboo.<sup>62</sup> According to the Catholic Church, population growth is seldom the cause of poverty and environmental problems.<sup>63</sup> In fact, advocates of controlled population growth are deemed cultural imperialists who merely want to maintain the current

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57. LOUIS HENKIN, *THE AGE OF RIGHTS* 184 (1990).

58. *Id.*

59. *Genesis* 2:28.

60. Janet Benshoff, *The Establishment Clause and Government-Funded Natural Planning Programs: Is the Constitution Dancing to a New Rhythm?*, 20 N.Y.U. J. INT'L L. & POL. 1, 5 (1987).

61. *Id.*

62. Mary Jo McConahay, *Seven Children . . . Four Alive*, SIERRA, Nov.-Dec. 1993, at 64; *contra* Paul R. Ehrlich & Anne H. Ehrlich, *The Most Overpopulated Nation*, in NPG FORUM 1 (Jan. 1991). The authors indicate that few Catholics pay attention to the Church's stance on birth control as seen in Italy, which has the world's smallest family size. Brazil, with the largest Roman Catholic population, 75% of 154 million, generally ignores the Catholic Church's teaching on family planning, birth control, and abortion. James Brooke, *With Church Preaching in Vain, Brazilians Embrace Birth Control*, N.Y. TIMES, Sept. 2, 1994, at A1.

63. Alan Cowell, *Scientists Linked to the Vatican Call for Population Curbs*, N.Y. TIMES, June 16, 1994, at A6.

world order.<sup>64</sup> The Catholic Church maintains that population growth concerns must be addressed along with economic development, health care, education and women's rights.<sup>65</sup>

## 2. Islam

The most practiced world religion after Christianity is Islam, with roughly one billion adherents.<sup>66</sup> The word "Islam" is an Arabic word for submission and obedience to God,<sup>67</sup> who permeates all aspects of life. For the Muslim, "Islam defines the purpose of creation, human destiny, and the relationship between humans and other creatures."<sup>68</sup> "It also governs the Muslims' private, social, political, economic, moral and spiritual affairs."<sup>69</sup> Islamic law, commonly called 'Shariah', has five sources: (1) the Quran (the Holy book of the Muslims), (2) the Sunnah (traditions attributed to Prophet Muhammad), (3) Quas (reasoning on issues and problems that have an analogy in the Quran or Sunnah), (4) Idjma (consensus of learned islamic scholars) and (5) Idjtihad (reasoning on issues and problems which have no analogy in the Quran or the Sunnah).<sup>70</sup> Islam is so pervasive in Islamic countries that Saudi Arabia states the Quran is its constitution.<sup>71</sup> Islamic law reflects, "At the very root of the Muslim conception of law lies the idea that law is inherently and essentially religious."<sup>72</sup>

Efforts to control population must acknowledge this relationship between

64. *Id.*

65. Alan Cowell, *Vatican Rejects Compromise on Abortion at U.N. Meeting*, N.Y. TIMES, Sept 7, 1994, at 1.

66. WORLD ALMANAC, *supra* note 55, at 727; RODOLPHE J.A. DE SEIGE, THE SHAR'IA: AN INTRODUCTION TO THE LAW OF ISLAM 5 (1994).

67. GHULAM SARWAR, ISLAM BELIEFS AND TEACHINGS 13 (1989).

68. *Id.*

69. *Id.*

70. ABDULMUNIM SHAKIR, CONSTITUTIONS OF THE COUNTRIES OF THE WORLD (Albert P. Blaustein & Gisbert M. Flanz eds., 1976).

71. *Id.* at 1.

72. FALZUR RAHMAN, ISLAM 68 (2nd ed. 1979); *see also* Matthew Lippman, *Islamic Criminal Law and Procedure: Religious Fundamentalism v. Modern Law*, 12 B.C. INT'L & COMP. L. REV. 29 (1989); James C.N. Paul, *Islam And The State: The Problems of Establishing Legitimacy And Human Rights*, 12 CARDOZO L. REV. Vol. 1057 (1991); David J. Karl, Note, *Islamic Law in Saudi Arabia: What Foreign Attorneys Should Know*, 25 GEO. WASH. J. INT'L L. & ECON. 131 (1991); Steven D. Jamar, *The Protection of Intellectual Property Under Islamic Law*, 21 CAP. U. L. REV. 1079 (1992); David Aaron Schwartz, Note, *International Terrorism and Islamic Law*, 29 COLUM. J. TRANSNAT'L L. 629 (1991); Noor Mohammed, *Principles of Islamic Contract Law*, 6 J.L. & RELIGION 115 (1988); Ken Brown, *Islamic Banking: Faith and Creativity*, N.Y. TIMES, Apr. 8, 1994, at D1; John Makdisi, *Fixed Shares in Inestate Distribution: A Comparative Analysis of Islamic and American Law*, 1984 B.Y.U.L. REV. 267 (1984); John Makdisi, *Islamic Law Bibliography*, 78 L. LIBRARY J. 103 (1986).

the state and religion in the Islamic world,<sup>73</sup> particularly because the Third World has a sizeable Muslim population: 278,250,800 in Africa; 636,976,000 in Asia and 1,350,500 in Latin America.<sup>74</sup> Islam has been described as "a complex cultural synthesis, centred [sic] in a distinctive religious faith, and necessarily set in the framework of a continuing political life."<sup>75</sup> An understanding of Islamic cultures is vital toward understanding how Islamic countries affect non-Islamic countries.<sup>76</sup> Mosques are sources of political power, and with the diminished presence of communism, Islam purports to be an ideological alternative to capitalism.<sup>77</sup>

Islamic leaders challenged a United Nations document on population and development, alleging that the document condoned extramarital sex, homosexuality, abortion, and prostitution.<sup>78</sup> Efforts to control population growth must incorporate Islamic viewpoints, particularly when two billion people that will be born in the world's poorest countries will be Muslim.<sup>79</sup> Even though Muslims are found all over the world, most scholarly work focuses on the Middle East, with little attention being given to the influence of Islam in Asia and Africa.<sup>80</sup> In fact, "over four-fifths of all Muslims are non-Arabs, with the majority of the worldwide community living in South and Southeast Asia."<sup>81</sup> Indonesia has the largest Muslim population

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73. This relationship varies considerably from the American relationship between church and state, where the state must be completely neutral toward religion. See *Wallace v. Joffe*, 472 U.S. 38, 60 (1985); *Walz v. Tax Comm'n*, 397 U.S. 664, 669 (1970); *Abington Sch. Dist. v. Schempp*, 374 U.S. 203, 226 (1963); *Lemon v. Kurtzman*, 403 U.S. 602, 612-613 (1991) (where the court articulated a legal standard for church-state cases. The statute must have a secular purpose, a principal or primary effect that neither advances nor inhibits religion, and does not foster excessive government entanglement with religion).

74. WORLD ALMANAC, *supra* note 55, at 727.

75. P.M. HOLT, *THE CAMBRIDGE HISTORY OF ISLAM* xii (1970).

76. See Fabio Altman, *The Muslims are Coming*, WORLD PRESS REV., May 1994, at 8-13; Christopher Dickey, *Islam is not the Issue*, NEWSWEEK, May 30, 1994, at 53.

77. "It has been asserted that nationalism, socialism, communism and capitalism have failed, however the Islamic era may just be dawning." Judith Miller, *Faces of Fundamentalism*, 73 FOREIGN AFF. Nov.-Dec. 1994 at 123, 142.

78. John Lancaster, *Muslims Join Vatican's Stand on Population*, INT'L HERALD TRIB., Aug. 13-14 1994, at 1; see also Alan Cowell, *A Try at a Truce Over Population*, N.Y. TIMES, Sept. 5, 1994, at A1, A2.

79. Lancaster, *supra* note 78, at A2.

80. Richard M. Eaton, *Islamic History as Global History*, in ISLAMIC AND EUROPEAN EXPANSION 22 (Michael Adas ed., 1993). "This is probably due to the Arab-focus of Islam. First, Muslims are told the language of God is Arabic. Secondly, a pilgrimage to Mecca is required. Third, prayer is required five times a day — at a minimum — while the Muslim faces Mecca. Fourth, Muhammad is considered the final prophet of God. Finally, a Muslim usually adopts Arab attire and an Arab name." MOLEFI KETE ASANTE, *AFROCENTRICITY* 3 (1992).

81. For example, China has a long-standing Islamic tradition. DRU C. GLADNEY, *MUSLIM CHINESE ETHNIC NATIONALISM IN THE PEOPLE'S REPUBLIC* (1991). An estimated 50 million Muslims reside in China. Marco Restelli, *China's Secret Holy War*, WORLD PRESS REV., May 1994, at 43. Europe also has a large Muslim population, especially in Germany, Britain, Italy, Spain,



followed by Pakistan, Bangladesh, and India."<sup>82</sup> There must be, therefore, further research on Islam within the context of these cultures and how both the cultural traditions and Islam create particular views on birth control and the environment. Islam advances political and philosophical positions on the use of birth control. In addition, there are 500 verses in the Quran relating to humanity's relationship and with duties to the natural environment.<sup>83</sup>

### 3. African Traditional Religions

In addition to Christianity and Islam, other religions also govern the lives of indigenous peoples.<sup>84</sup> Specifically, in Africa, traditional religions are alive and well.<sup>85</sup> The following is a chart of sub-Saharan Africa depicting both 1992 population estimates and percentage of persons who practice traditional religions.

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Scandinavia and France. Approximately four million Muslims live in France, and the country is experiencing a French-Muslim cultural clash based upon fears of Islamic fundamentalism stemming from Turkey and Algeria. Thomas Kamm, *Clash of Cultures Rise of Islam in France Rattles the Populace and Stirs a Backlash*, WALL ST. J., Jan. 5, 1995, at A1, A6.

82. Eaton, *supra* note 80.

83. Al-Mafiz, *Masri Islam and Ecology*, in ISLAM AND ECOLOGY 2 (Fazlun Khalid & Joanne O'Brien eds., 1992).

84. Certain Native American cultures perceive humans as part of creation rather than rulers of creation. "This we know: the earth does not belong to man: man belongs to the earth . . . whatever befalls the earth, befall the sons of the earth. Man did not weave life: he is merely a strand in it. Whatever he does to the web, he does to himself." Edith Brown Weiss, *Agora: What Obligation Does Our Generation Owe to the Next? An Approach to Global Environmental Responsibility*, 84 AM. J. INT'L L. 198 (1990) (quoting Chief Seattle, LETTER TO U.S. PRESIDENT FRANKLIN PIERCE (1855)). Other indigenous persons, such as native Hawaiians, link clans with nature, and people are perceived as siblings and trustees of nature. Thus, humans are not perceived as conquerors of nature, but instead owe certain duties to nature. See Symposium, *Race, Class and Environmental Regulation*, 63 U. COLO. L. REV. 839, 856-57 (1992); THE NATIVE AMERICAN ALMANAC 633, 638 (Duane Champagne ed., 1994) (discussing how Native American religions and the Christian religion have different perspectives); Marc Peyser & Sonya Zalubowski, *Between a Wing and a Prayer*, NEWSWEEK, Sept. 19, 1994, at 58 (discussing the clash between Native American religion, environmentalist, and religious freedom). Historically, Native Americans have been prohibited from the practice of their traditional religions to the advantage of land developers and miners. VINE DELORIA, JR., GOD IS RED: A NATIVE VIEW OF RELIGION 3 (1994). There was an inherent conflict between European colonialists and Africans because the former focused on individual ownership of land and natural resources while the latter had a more communal concept of land.

85. This view is contrary to the popular view that the colonization of Third World countries destroyed the identity of the colonized people. THEODORE W. ALLEN, THE INVENTION OF THE WHITE RACE 35 (1994); William Pfaff, *A New Colonialism? Europe Must Go Back Into Africa*, FOREIGN AFF., Jan./Feb. 1995, 2, 5 (asserting that when Europeans arrived in Africa there were functioning societies, but colonialism destroyed the social, political, customary and legal institutions of such societies. He therefore, advocates for former colonial powers to return to Africa as trustees to govern certain African countries.).

COUNTRY	POPULATION	% TRADITIONAL
Benin	4,997,000	50+
Botswana	1,300,000	50
Burkina Faso	9,653,000	65
Cameroon	12,658,000	51
Central African Republic	3,029,000	24
Chad	5,238,000	23
Congo	2,376,000	47
Côte d' Ivoire	13,497,000	63
Ghana	16,185,000	38
Guinea-Bissau	1,074,000	54
Liberia	2,462,000	70
Madagascar	12,596,000	52
Mozambique	15,469,000	60
Rwanda	8,206,000	25
Sierra Leone	4,456,000	30
Sudan	28,305,000	18
Swaziland	913,000	40
Tanzania	27,791,000	33
Togo	3,958,000	50
Zambia	8,745,000	Predominantly
Zimbabwe	11,033,000	Predominantly <sup>86</sup>

Among the twenty-one Sub-Sahara countries listed above<sup>87</sup> that have a population which practices traditional religions, more than half have traditional religions as the predominate religion.<sup>88</sup> Despite historical developments and transformations in Africa, traditional African religions have not

86. WORLD ALMANAC, *supra* note 55, at 739-828.

87. Certain countries were not listed because traditional religions are supposedly not practiced or information was not available.

88. "Traditional religion" includes "indigenous African religion," "tribal religion," "voodoo," "vodu or vudu," "Fetishism," "Animism," Dynamism, Paganism, "Totemism" and "Naturism." The multiplicity of terms reflects the attitudes adopted towards indigenous African religion. See JOHN S. MBITI, *AFRICAN RELIGIONS AND PHILOSOPHY* 10 (2d ed. 1989). For a discussion on traditional African religions and their reliance on herbs, minerals, and roots for treatment of physical and psychological disorders, see KWABENA FAHEEM ASHANTI, *ROOTWORK AND VODOO IN MENTAL HEALTH* (1990).

only survived, but have continued to dominate the lives of African peoples.<sup>89</sup> "In traditional Africa, religion is life and life, religion."<sup>90</sup> In African traditional religions, every activity in life is a form of religious practice. One practices religion, "in whatever they do — whether it be farming, fishing, or hunting; or simply eating, drinking or travelling."<sup>91</sup> For example, traditional dance ceremonies celebrate certain values or address perceived conflicts in society. While, eating from the same bowl — a common African practice — expresses a collective identity. Traditional African religions, as with any other religion, provide identity, norms and boundary-maintenance. It gives definition to life in this world and the hereafter.<sup>92</sup> Therefore, to understand Africa and its peoples, one must examine the influence of traditional religions.<sup>93</sup>

Traditional African religions have an ontological order based on six hierarchical categories: (1) God or great spirit, (2) ancestral human spirits, (3) supernatural human entities or lesser dieties, (4) natural objects in nature, (5) mystical power, and (6) charms, amuluts, and talismans.<sup>94</sup> God is always known by a local name and is recognized as an "all-seeing" power<sup>95</sup> and the creator of the universe.<sup>96</sup> God is perceived as a spirit, and there are usually no images constructed. Because God controls the universe, there are no rules for when or where to worship God. The general belief is if one wants to speak to God, then one must speak to the wind (God is everywhere). Secondly, after God, are the human spirits. Namely, that part of a human that survives death. Life has no opposite and death is the river of life. In death the spirit goes and returns. Consequently, ancestors are always treated with respect.<sup>97</sup>

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89. MBITI, *supra* note 88, at 10.

90. KOFI ASARE OPOKU, *WEST AFRICAN TRADITIONAL RELIGION* 1 (1978).

91. *Id.* One author noted that the most prominent characteristic of African traditional religions are their "absorbing character." Traditional religions in Africa define life, death, and social relations. The author asserts that Africans live religiously, act religiously, and die religiously. See ARCHDEACON J. OLUMIDE LUCAS, *RELIGIONS IN WEST AFRICA AND ANCIENT EGYPT* 40 (1970).

92. For a discussion on the impact of religion and morality on population in Africa, see *RELIGION, MORALITY AND POPULATION DYNAMICS* (John S. Pobee ed., University of Ghana Population studies No. 8, 1974).

93. *See id.* A critical analysis of African social-dynamics in relating to population issues should include an examination of customs, traditional religion, and philosophy. In addition, the impact of colonialism, wars, migration, natural disaster, and foreign invasion or influence warrant extensive research. For example, it has been asserted that the traditional African family is such a well-structured unit that a capitalist economy creates catastrophic results for the traditional African family. *See* JULIUS K. NYERERE, *NYERERE ON SOCIALISM* 11-14 (1969).

94. OPOKU, *supra* note 90, at 9-10.

95. JOHN S. MBITI, *CONCEPTS OF GOD IN AFRICA* 3-5 (1970).

96. OPOKU, *supra* note 90, at 9.

97. *Id.* at 36. The ancestors are deemed close to God and are thus feared and respected. PATRICK AKOI, *RELIGION IN AFRICAN SOCIAL HERITAGE* 210 (1970). Respect for and a continual relationship with ancestors is found among various peoples such as the Edo of Nigeria, Samoans in the Pacific,

Nature and animals are also perceived as having a "spirit." This belief has ecological impact. For example, as one author explains, in Ghana, West Africa, Tuesday is the day to pay respect to the spirit of the sea. It was a taboo to fish on Tuesday. The practice of not fishing on Tuesday had profound ecological impact — an assurance there would always be fish. The ocean replenished itself and fishermen were able to mend their nets. In addition, fishermen were required to sacrifice some of their catch to the "god" of the sea. The fish sacrificed had to be alive when thrown back into the water. Farmers also faced certain taboos. They were forbidden to till the earth on certain days — allowing the earth to replenish itself — and, in bringing home palm fruit they had to leave nuts in the forest or on the farm. This allowed seeds to germinate and grow into trees. Those who did not observe these taboos were considered threats to society.<sup>98</sup>

Ironically, such environmental practices arising out of traditional religions are perceived as pagan and idolatrous and the destruction of such long-held beliefs resulted in continuous fishing. A move away from the traditional practice of not fishing on Tuesday, in light of population growth, places tremendous strain on the environment and threatens human survival.<sup>99</sup>

Africans express values through art, proverbs, names, prayers, myths, stories, festivals, and ceremonies.<sup>100</sup> These values permeate African societies and affect matters of sex, marriage, procreation and family life — all of which impact population growth.

In Africa, procreation is a virtue. The inability to produce offspring is considered one of the greatest misfortunes in African societies. Barrenness and sterility are threats to human existence and are condemned by many West African societies. So serious is this calamity that in some African societies childless people cannot be regarded as ancestors after death.<sup>101</sup> In

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Australian aborigines, Zulu of South Africa, Malabar of India, Chinese, Japanese, ancient Romans and Greeks. PETER SARPONG, *THE SACRED STOOLS OF THE AKAN* 5 (1971); see also E. BOLAYI IDOWU, *AFR. TRADITIONAL RELIGION* 178-189 (1973).

98. Kofi Asare Opoku, *The Traditional Foundations of Development*, 4 UHURU 25 (1992).

99. Religious practices used in traditional Africa to protect the environment have been "undermined by religion and modernity." *Lawyer Wants Stiffer Penalty for Environmental Abusers*, DAILY GRAPHIC (GHANA NEWSPAPER), Aug. 6, 1994, at 16.

100. For example, some have estimated that as many as 3,680 Akan proverbs date back to 1879. C.A. ACKAH, *AKAN ETHICS: A STUDY OF THE MORAL IDEAS AND THE MORAL BEHAVIOR OF THE AKAN TRIBES OF GHANA* 49 (1988); see also J.W. TU FUAO & C.E. DONKOR, *ASAHTIS OF GHANA* 53 (1989). In addition, the aspirations of fertility and having healthy children are reflected in the Ashanti fertility doll, found in Ghana, where women wore the small wooden dolls on their back to ensure fertility and healthy children. WILLIAM BASCOM, *AFRICAN ART IN CULTURAL PERSPECTIVE* 74 (1973); FRANCESCO ABBATE, *AFRICAN ART AND OCEANIC ART* 56-57 (1972); LADISLA SEGÝ, *MASKS OF BLACK AFRICA* 17-23 (1976).

101. OPOKU, *supra* note 90, at 124. The inability to become an ancestor is a profound calamity in African society because, next to God, ancestral spirits play a prominent role in African traditional religion. *Id.* at 36.

the past, the Akan of Ghana drove thorns into the feet of childless people when they died to prevent them from walking back into society to be reborn.<sup>102</sup> The importance of children in African society is expressed in the following proverbs:

- There is no wealth where there are no children.<sup>103</sup>
- Children are a gift of God.<sup>104</sup>
- Nothing is as painful as when one dies without leaving a child behind.<sup>105</sup>
- To leave no living heirs behind him is the worst evil that can befall a man, and there is no curse more terrible to put on a man than to wish him to die childless.<sup>106</sup>
- A cow gave birth to a fire: she wanted to lick it, but it burned, she wanted to leave it, but she couldn't because it was her own child.<sup>107</sup>

Child birth is such a cherished event in African society that special ceremonies are performed in honor of the newborn.<sup>108</sup> In certain African societies, puberty rights for females include a request during a ceremony in which elders ask, "... protect them, that they may deliver twelve children and thus sleep on twelve beds!"<sup>109</sup>

In the African tradition, "marriage and procreation are inseparable."<sup>110</sup> At the birth of a child, individuals, families and communities in Africa give thanks to God.<sup>111</sup> Therefore, in African society, there is a duty to produce children.<sup>112</sup>

It is difficult to obtain data on who practices traditional African religions because traditionalists do not build houses of worship. Traditional African religions may also lack a text, in the European sense.<sup>113</sup> In addition, African

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102. OPOKU, *supra* note 90, at 124.

103. KOFI ASARE OPOKU, PROVERBS FROM AFRICA 6-7 (1994).

104. *Id.*

105. *Id.*

106. *Id.*

107. *Id.* at 50.

108. OPOKU, *supra* note 90, at 107; *see also* PAUL S. WINGERT, PRIMITIVE ART: ITS TRADITIONS AND STYLES 29 (1962) (discussing how childbirth represented social continuity and stability and led to the creation of African Art Forms).

109. OPOKU, *supra* note 90, at 121.

110. *Id.* at 124.

111. MBITI, *supra* note 88, at 209; *see also* E. BOLAYI IDOWU, OLODUMARE GOD IN YURBA 121 (1963).

112. JOMO KENYATTA, FACING MT. KENYA 157 (1965).

113. Distinct writing systems exist in Africa. These systems include pictograms, ideograms and syllabic scripts. Among the Akan of Ghana, ideograms depict complex ideas (which include religious concepts). KEMET MOLEFI ASHANTE, AFROCENTRICITY AND KNOWLEDGE 73-74 (1990). The Akan have an ideogram of a bird with its head turned around reaching for an egg. The ideogram is called Sankofa. It means "return and pick it up." The ideogram teaches one to learn and build from the past. It symbolizes a going back to one's roots for community development, progress, and prosperity.

traditional religions can often blend with Islam or Christianity. For example, some traditionalists may rely upon Muslim beliefs for certain charms to cure certain illnesses,<sup>114</sup> and some Muslims or Christians may consult Traditionalists.<sup>115</sup>

The formalities of Islamic prayer can coexist with traditional practices. In the northern and upper regions of Ghana, a chief would sit and pray on the skin of a goat, sheep, cow, hyena, buffalo, leopard, lion, or elephant. The skin symbolized the chief's power. The type of skin depicted his status. "If it is one of a fearful animal, he is a powerful chief."<sup>116</sup> Because a skin is easy to transport, others would sit or sleep on a sheep or cattle skin.<sup>117</sup> Today, in certain parts of Ghana some Muslims will pray, not on a mat or rug, but on animal skins. Thus, you find a combination of traditional religions with Islam.

Part of the reason for this co-existence is that Islam, contrary to popular view, is not a monolithic structure. All Muslims believe that there is no God but God (meaning there is only one God) and Muhammad is His messenger. Other practices, such as public prayer, facing Mecca during prayer and a pilgrimage to Mecca are universally observed. However, in theory, Islam lacks a formal hierarchy, and therefore, opinions differ as to customs, practices, laws, and the general nature of God.<sup>118</sup> It is these differences which allow for a traditional African and Islamic blend — a hybrid of sorts — where traditional religions often complement Islam and vice versa. Thus, in Africa, Islam can often include dancing, drumming, singing, naming ceremonies, masking cults, and certain marriage and burial practices that are traditionally African,<sup>119</sup> and not part and parcel of Arab Islam.

Finally, traditional religious beliefs also generate African customary laws

Another symbol is called Gye Nyame and when translated it means "except God" or "fear only God." The ideogram reflects God's omnipotence, omnipresence, and omniscience. INFO. SERVICES DEPT., AN OFFICIAL HANDBOOK OF GHANA 114 (1991).

114. ELLIOTT P. SKINNER, *AFRICAN URBAN LIFE: THE TRANSFORMATION OF OUAGADOUGOU* 343-45 (1974). Generally, Christianity and Islam are more common in urban Africa, while traditional religion thrives among the rural population. EVT ENGMANN, *POPULATION OF GHANA* 3 (1986).

115. In his discussion of the introduction of Christianity in an African society, Mbiti notes that the Akamba [of Kenya], whether Christian or otherwise, are connected with traditional religious beliefs and such beliefs are either dormant or active, but nonetheless play a prominent role in the lives of the Akamba. JOHN S. MBITI, *NEW TESTAMENT ESCHATOLOGY IN AN AFRICAN BACKGROUND* 4-10 (1971).

116. Ghana Education Service Curriculum Research and Dev. Div., *CULTURAL STUDIES FOR JUNIOR SECONDARY SCHOOL'S PUPILS BOOK* 3, 66 (1989).

117. *Id.*

118. J.O. Hunwick, Inaugural Lecture Delivered at the University of Ghana (Dec. 10, 1975) (on file with the author). The Nation of Islam, founded by Elijah Muhammad, also reflected an adoption of Islam with a meshing of particular African American historical concerns. C. ERIC LINCOLN, *BLACK MUSLIMS IN AFRICA* (3d ed. 1994).

119. HUNWICK, *supra* note 118, at 20-22.

including fashioning legal sanctions, domestic relations, property law, intestate and testamentary succession, crime and tort cases.<sup>120</sup> "Customary law constitutes a major source of law in Africa. Generally defined to include the uncoded practices of the different ethnic communities, it is recognized in judicial proceedings and, when applicable, is given the same force and effect as written law."<sup>121</sup>

In a traditional setting, the objectives of marriage law are sexual cohabitation, procreation, and maintenance of a household.<sup>122</sup> Procreation is vital because children provide lineage, foundation, men for war, and respect because a large family is associated with wealth.<sup>123</sup> In societies throughout Asia, Africa and Latin America large families are essential because children are an integral part of the family structure. They perform agricultural work, gather wood, retrieve water, care for younger children and assist the ill and elderly. Their assistance is indispensable in societies that may lack adequate health insurance, pension plans and social security.<sup>124</sup>

#### B. PATENT LAW

The area of patent law overlaps with traditional religions because the latter gives rise to traditional medicine. Traditional medicine uses natural products to cure human physical and psychological illnesses. Traditional healers rely heavily upon plants for a source of their medicines. It is incomplete to discuss poor agriculture, as it relates to poverty, without understanding how current patent laws adversely impact agricultural development and foster Third World poverty.

It is estimated that three-quarters of all plant-derived prescription drugs were discovered from their prior uses in indigenous medicine.<sup>125</sup>

120. JOHN WUOL MAKEC, *THE CUSTOMARY LAW OF THE DINKA PEOPLE OF SUDAN* 18-20 (1988).

121. Paul Kuruk, *Refugeeism, A Dilemma In International Human Rights: Problems In the Legal Protection of Refugees in West Africa*, TEMP. INT'L & COMP. L.J. 179, 192 (1987).

122. MAKEC, *supra* note 120, at 61.

123. *Id.*; Gordon R. Woodman, Note, *Essentials of An Akan Customary Marriage: McCabe v. McCabe*, J. AFR. L., Autumn 1993, at 199 (discussing the relationship between state law and customary law and the practical difficulties courts face in implementing the two in a single forum); see also C.E.K. Kumado, *Chieftaincy and the Law in Modern Ghana*, 18 U. GHANA L.J. 194 (1990-92); Kwasi Wiredu, *An Akan Perspective on Human Rights*, in HUMAN RIGHTS IN AFRICA: CROSS-CULTURAL PERSPECTIVES 243 (1990).

124. Rohrgough, *supra* note 16, at 238; WORLD LABOUR REPORT 53 (1993) (discussing the lack of social security and pension plans in Third World countries and how such countries develop networks of mutual support through families and communities). Children represent wealth and security in a world of fleeting wealth, insecurity and shortages of food, money, and gasoline. Caroline Bledsoe, *Children Are Like Young Bamboo Trees in*, POPULATION, ECONOMIC DEVELOPMENT AND THE ENVIRONMENT 111-132 (Kerstin Lindahl-Kiessling & Hans Landberg, eds. 1994).

125. Hope Shand, *Patenting The Planet*, 15 MULTINATIONAL MONITOR 9 (1994) (discussing efforts by industrialized nations to patent the genes of indigenous people); see Rainer Moufang, *Patenting*

Prescription drugs have a world market value of \$43 billion.<sup>126</sup> The essential question is how much of the profit from these commercial products are going to traditional healers? The question is important because any effort to initiate dialogue about population control must consider economic development. Would African and other Third World countries have a more stable economy and financial stability to provide for the increased population if they had a share of \$43 billion from prescription drugs? The dialogue shifts from a focus on population to economics.<sup>127</sup>

United States patent laws affect traditional healers because patent laws allow a nation to patent its products from a plant, but not the plant itself. In *Diamond v. Chakrabarty*<sup>128</sup>, the United States Supreme Court held that live, human-made micro-organisms are patentable. In *Chakrabarty*, the respondent, a microbiologist, filed a patent application for his invention of human-made genetically engineered bacteria capable of breaking down multiple components of crude oil. His invention had significant value for more efficient and rapid oil-spill control. The patent examiner rejected the respondent's patent claim on two grounds: (1) micro-organisms are products of nature, and (2) living things are not patentable subject matter under the Patent Act.<sup>129</sup> Section 101 of the Patent Act provides: "Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a

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*Human Genes, Cells and Parts of the Body? — The Ethical Dimensions of Patent Law*, 4 INT'L REV. INDUSTRIAL PROP. & COPYRIGHT L. 487 (1994).

126. Shand, *supra* note 125, at 11.

127. Korea and China demonstrate that given the right infra-structure, viable economy grounded in science, and technology, population growth becomes a manageable phenomenon. China demonstrates the use of guided capitalism, in contrast to market capitalism. Guided capitalism relies upon state land and subsidies. The state becomes a major force in economic development. The Peoples Liberation Army (PLA) operates companies and manipulates tariffs and taxes which has led to a military-run business empire. Kathy Chen, *Soldiers of Fortune: Chinese Army Fashions Major Role for Itself as a Business Empire*, WALL ST. J., May 24, 1994, at A1. The same holds true for Taiwan, South Korea, Singapore, and Hong Kong. Paul H. Brietzke, *Accountability In The 'Brave New World of Development'*, THIRD WORLD LEGAL STUDIES 99, 118 (1992); see Kathy Chen & Marcus W. Brauchli, *Capitalist Road Chinese Entrepreneurs Revive Ties Forged In Cultural Revolution*, WALL ST. J., Apr. 21, 1994, at A1 (discussing the relationship between The Red Guards of China's Cultural Revolution and Modern Entrepreneurs in China); see also Gayheart Edem Mensah, *President: China's Progress Must Guide 3rd World*, GHANAIAAN TIMES (Newspaper), Aug. 3, 1994, at 1 (observing that the Ghanaian government, in assessing cost and suitability, announced that China's pattern of development and technological know-how was an appropriate form of capitalism for Third World countries. China and Ghana are seeking to strengthen economic cooperation); *contra* Marc Levinson & George Wehrfritz, *Some Cracks in the Wall of the Miracle Economy — China: The Central Government is Losing Control*, NEWSWEEK, May 16, 1994, at 46; Patrick E. Tyler, *Cash Flow Problems, China's Marxist Industries Try Diversification*, N.Y. TIMES, May 5, 1994, at A10 (suggesting that "all that glitters is not gold" because China's good economic times are in danger).

128. *Diamond v. Chakrabarty*, 447 U.S. 303 (1980).

129. *Id.*



patent therefore, subject to the conditions and requirements of this title."<sup>130</sup> The United States Patent and Trademark Office Board of Appeals affirmed. The United States Court of Customs and Patent Appeals reversed. The Supreme Court affirmed holding that a live, human-made micro-organism is patentable. The discovery of previously unknown plant or animal which naturally exist is not patentable.<sup>131</sup> However, under *Chakrabarty*, a human-modified or genetically engineered micro-organism, plant or animal is patentable because such micro-organisms are considered a "manufacture" or a "composition of matter" under section 101.

The impact of *Chakrabarty* is evident from the following. In colonial Africa, a white man in East Kenya had cancer, and the existing medical treatment failed. A local traditional healer treated the ailing man and the man's life was prolonged. The herbalist's traditional plants were later tested by scientists outside of Africa. The tests revealed that the plant lowered blood sugar and destroyed white blood cells. The compounds were isolated, and proved useful in combatting leukemia. The plant contained Vincristine (treats childhood leukemia), Vin Brastine (Hopkins disease), Vin Rosidine and Vin Leu Rosine. The foreign scientist and pharmaceutical companies profited but neither the traditional healer nor Kenya were paid royalties for products based on the biological resources and knowledge of their culture.<sup>132</sup>

A means to combat the effects of rising population is to allow Third World countries to exploit their own genetic resources. This would strengthen food production and conservation due to greater flows of information vital to agricultural, scientific and economic development, which in turn would reduce population growth.<sup>133</sup> A share of biological profits would assist in economic development. In order to facilitate the sharing of profits, patent laws should not permit multinational corporations to gain monopoly control over micro-organisms. A multinational corporation monopoly could adversely affect the environment, farmers and citizens of Third World countries.<sup>134</sup>

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130. 35 U.S.C.S. § 101 (1995).

131. 447 U.S. at 303.

132. Esi Sutherland-Addy, Address at the National Conference of Black Studies (NCBS), Accra, Ghana Summer Institute (Aug. 2, 1994) (this story was related to the author by Professor Esi Sutherland-Addy, a professor at the University of Ghana, Legon, West Africa).

133. "While there is a considerable transfer of technology from advanced nations to developing countries, not much progress has been made in respect of movement of technology from the town to the village within a developing economy. As a result, it is in agriculture more than industry that many developing countries lag behind as compared with a developed country." Partha Basu, *Technology Transfer and Rural-Urban Dualism*, in *TECHNOLOGY TRANSFER IN DEVELOPING COUNTRIES* 140 (Manas Chatterji, ed., 1990). See Kenneth D. Kaunda, Speech at the 17th Annual and First International Conference of the National Council for Black Studies, Accra, Ghana (Aug. 6, 1993).

134. *GATT: U.S. 'TRIPS' Plan Would Allow Monopoly of Genetic Resources, Greenpeace Says*, 7 INT'L TRADE REP. 1805 (1990).

## C. HEALTH CARE

Current population control efforts focus on family planning with fertility as the focal point. Health care problems in Third World countries demonstrate that it is useless to teach the virtues of family planning when the corresponding support for those virtues is non-existent. Problems, such as poor health care facilities in the Third World, encourage women to have many children because they know that they will lose numerous children to measles, malaria or diarrhea. Therefore, it becomes problematic to tell a woman to stop having children.

In Ghana, pregnancy and childbirth are considered warfare, because they are usually associated with death.<sup>135</sup> The Ga peoples of Ghana believe newborn children face seven dangers, so the family waits seven days before bringing the child out for public view and the official naming ceremony. If the child survives the seven day period he or she is then deemed worthy to be called a person.<sup>136</sup> In Ghana, children's health problems are caused by communicable disease and malnutrition.<sup>137</sup> Communicable diseases in Ghana are those passed from direct contact with an infected person or those passed by air, water, animals and insects. The diseases include "diarrhea, dysentery, malaria, hookworm, and schistosomiasis." They are all linked to poverty, ignorance of diseases and poor health care.<sup>138</sup>

The Mezquital community, on the outskirts of Guatemala City, is the most populous city in Central America, with a population of ten million.<sup>139</sup> Terms such as "family planning" and "reproductive rights" are far away from the deepest concerns of the residents. Their major concerns are cholera, intestinal worms, and finding food.<sup>140</sup> Similarly, in Pelotas, a city in Southern Brazil, 32% of infant deaths are caused by infectious diseases, while diarrhea and respiratory infections each account for 12% of infant deaths.<sup>141</sup>

Ironically, Third World countries spend 80-90% of their health budget on hospitals, but have the highest infant mortality rate worldwide.<sup>142</sup> Infant

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135. PETER SARPONG, GHANA IN RETROSPECT 85 (1974).

136. OPUKU, *supra* note 90, at 107-8.

137. Patrick A. Twumasi, Proceedings of a Workshop Held in Accra, Ghana (1988), in RESEARCH ISSUES IN CHILD HEALTH AND CHILD CARE 27 (Fiona MacKenzie ed., 1988).

138. *Id.* at 28.

139. McConahay, *supra* note 62, at 62.

140. *Id.* at 64. In Third World countries, diarrhea is a leading cause of infant death. *Id.* at 65.

141. Fernando C. Barros et al., *Child Death and Child Care in Pelotas, Southern Brazil: Methodology and Results of a Longitudinal Study*, in RESEARCH ISSUES IN CHILD DEATH AND CARE 22-6 (Fiona Mackenzie ed., 1988) (proceedings of a workshop held in Accra, Ghana).

142. UNITED NATIONS ENVIRONMENT PROGRAM AND THE UNITED NATIONS DEVELOPMENT PROGRAM, WORLD RESOURCES REPORT 29-30 (1992-1993). Infant mortality rates are the number of deaths during the first year per 1,000 live births. The statistics are alarming: Nigeria 109, India 89,

mortality rate for Third World countries is 94 deaths per 1,000 live births, compared with 8 deaths per 1,000 in industrial countries.<sup>143</sup> Life expectancy in the United States for a child born in 1990 is 75.4 years, compared to 49 years for a child born in Nigeria, West Africa, a Third World nation.<sup>144</sup>

Sickle cell anemia is also a major concern in Africa. Seven to twenty-five percent of West African residents have a genetic predisposition toward the disease. The Fanti tribe in Ghana imitates the screams and moans of victims of sickle cell anemia, and tribal names for the disease translate as, "body chewing" or "body biting."<sup>145</sup>

The AIDS virus poses one of the greatest health threats to Third World countries.<sup>146</sup> Despite advances in child survival rates in the Third World, child mortality rates due to the AIDS virus will triple by the year 2010 in thirteen sub-Saharan<sup>147</sup> countries, in addition to Brazil, Thailand and Haiti.<sup>148</sup> In Thailand, the population will decline because of AIDS. By the year 2010, 209 of every 1,000 children will die of AIDS in Malawi and 103 in Thailand.<sup>149</sup> In highly affected areas such as Uganda, Zaire, Zambia, Zimbabwe, Haiti, Brazil and Thailand there will be a total of 121 million fewer people due to the AIDS virus.<sup>150</sup> Estimates suggest that 8 million people in sub-Saharan Africa are infected with the AIDS virus.<sup>151</sup> Sixty percent of those infected are fifteen to twenty-four years old.<sup>152</sup> There are an estimated 5,000 Africans that become infected with HIV every day.<sup>153</sup>

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and the United States 11. See ROBERT A. LEVINE ET AL., CHILD CARE AND CULTURE: LESSONS FROM AFRICA 94 (1994). In addition to health threats historically linked with Third World poverty, the children also face western health threats related to smoking, drugs, and television violence. *Children in Poor Countries Seen Facing Western Health Threats*, N.Y. TIMES, Sept. 24, 1995, at A4.

143. *Id.* at 30.

144. Goliber, *supra* note 49, at 459.

145. Warren E. Leary, *Intractable Pain of Sickle Cell Begins to Yield*, N.Y. TIMES, June 7, 1944, at B5-6.

146. It is also a major problem in the United States, where an estimated 800,000 to 1.2 million Americans are infected with the virus that causes AIDS. Lawrence K. Altman, *The Doctor's World: Obstacle-Strewn Road to Rethinking The Numbers on AIDS*, N.Y. TIMES, Mar. 1, 1994, at B8. AIDS is now the primary cause of death among women between the ages 25 and 44 in nine of America's largest cities, and the fourth leading cause nationwide . . . for women in that age group." Ann Quindlen, *AIDS? BUT IT CAN'T HAPPEN TO ME!*, MIAMI HERALD, Feb. 24, 1994, at A23. AIDS was first recognized as a distinct entity in the United States in 1981. MAX ESSEX, ET AL., AIDS IN AFRICA 1 (1994).

147. There are 45 countries in sub-Saharan Africa. *Commentary*, 270 J. AM. MED. ASSOC. 629 (Aug. 4, 1993).

148. Steven A. Holmes, *Child Death Rate for AIDS Expected to Triple by 2010*, N.Y. TIMES, Apr. 29, 1994, at A11.

149. *Id.*

150. *Id.*

151. USA TODAY (INT'L EDITION), Aug. 12, 1994, at A8.

152. U.N. Agency Reports AIDS Virus Spreading Very Quickly in Africa, N.Y. TIMES, Dec. 13, at B8.

153. *Id.*

Those exposed to the AIDS virus are generally more educated with a higher social status, thus adversely impacting Africa's more productive workers who cannot be replaced.<sup>154</sup> One eighty year old grandfather in Africa proclaimed, "It [AIDS] is like sweeping back the ocean using a broom. Once I had twenty-five children. Now I have five. I have to sit and watch them die until I die and it is over."<sup>155</sup>

The multiplicity of health concerns in Africa indicates that family planning works when provided in combination with social and economic development efforts. Efforts at family planning as a means to address Third World population growth must address intertwined health problems.<sup>156</sup>

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154. See Holmes, *supra* note 148, at A5; Julie Flint, *AIDS: The Plague Years*, AFR. REP., May-June 1994, at 29. Wars in Africa are also destroying a major portion of the youth. In Mozambique, 494,000 children have lost their lives because of war. JAMES CARBARINO, ET AL. 23 (1992). 500,000 people have been killed in Southern Sudan since 1983. Tom Masland, *Will it be Peace or Punishment? War crimes: Why No One Will Pay For The Murder Of 1 Million People*, NEWSWEEK, Aug. 1, 1994, at 37. Approximately 10,000 corpses were floating in Lake Victoria due to the war in Rwanda. MIAMI NEWS TIMES, June 23-29, 1994, at 8. In Liberia, 150,000 were killed in 1989-90, and 100,000 have been killed in Angola's civil wars. Jonathan Alter, *When the World Shrugs: Why Black-on-Black Violence Is So Often Blacked-Out*, NEWSWEEK., Apr. 25, 1994, at 34. In Somalia, war has resulted in the starvation of 350,000 (mostly children). Robert Caputo, *Tragedy Stalks the Horn of Africa*, NAT'L GEOGRAPHIC, Aug. 1993, at 98. In the 1980s alone, Africa had nine wars, numerous violent conflicts, coups, riots, and demonstrations. Raymond W. Copson, *Peace in Africa? The Influence of Regional and International Change*, in FRANCIS M. DENG & I. WILLIAM ZARTMAN, EDs., *CONFLICT RESOLUTION IN AFRICA* 22-23 (1991). Such wars have placed millions of land mines in the earth. The mines have killed and maimed countless people. KEVIN M. CAHILL, M.D., *CLEARING THE FIELDS: SOLUTIONS TO THE GLOBAL LAND MINES CRISIS* (1995). In Angola, there are 20 million land mines that kill 120 Angolans each month. Similarly, in Somalia and Mozambique millions of mines are in villages and water holes. The United Nations estimates that in Third World countries there are an estimated 105 million mines which will cost \$200 billion to \$300 billion to remove. Donovan Webster, *One leg, One Life at a Time*, N.Y. TIMES MAGAZINE, Jan. 23, 1994, at 29. Consequently, wars cause African nations to spend billions a year on armaments in the face of severe poverty. See also UNDP Report *Calls for Better Use of 'Peace Dividend'*, AFR. REP., July-Aug. 1994, at 5. Perhaps, one of the most startling effects of war on the natural environment was seen in the Persian Gulf War where a billion barrels of crude oil were released into the land and waters of Kuwait. Joseph B. Treaster, *To the Disasters of War, Add Defiled Desert*, N.Y. TIMES, Nov. 12, 1994, at 4. Ironically, in Sarajevo, war has created a baby-boom because parents are making a conscious effort to "replace" children that might be lost into war. Barbara Demick, *Bosnia's other Baby-Boom — Babies*, MIAMI HERALD, Feb. 11, 1994, at 11.

155. Flint, *supra* note 154, at 28.

156. "Only 37% of sub-Saharan Africans have clean drinking water; there is one doctor for every 24,500 people; illiteracy rates are as high as 80% in some countries." Marguerite Michaels, *Retreat from Africa*, FOREIGN AFF., Winter 1993, at 93. The death rate in Africa is higher than the global rate, and has remained unchanged for the past 25 years for infants and children. ENCYCLOPEDIA OF THE ENV'T, *supra* note 49, at 569 (1994). Life expectancy in Africa is expected to increase. During 1985-90 life expectancy was 52 years, however it is expected to reach 65.6 by the year 2020 to 2025, and 83.9 by 2145 to 2150. See LONG RANGE WORLD POPULATION PROJECTIONS TWO CENTURIES OF POPULATION GROWTH 1950-2150, *supra* note 21, at 7. Over the past 10 years, population in Africa increased while food production decreased. See STATE OF WORLD POPULATION, *supra* note 8, at 6. The particular problems of Africa have been ignored or belittled since the colonial period in Africa. SANFORD J. UNGAR, *AFRICA: THE PEOPLE AND POLITICS OF AN EMERGING CONTINENT* 20 (1986). The

Health care professionals should act as advocates to increase aid to Africa, focus on scientific research and technology to address Africa's particular needs and make a personal commitment to help international volunteer agencies.<sup>157</sup> Health care advocates must address the role of women in African society. Specifically, they must examine further the various paternal and maternal societies in Africa before categorically advancing family planning and the rhetoric of social oppression of women. They must also address the fact that smoking kills three million people worldwide every year — or one person every ten seconds.<sup>158</sup> Approximately 1.2 billion smokers live in Third World countries.<sup>159</sup> In sum, a reduction in population growth must focus on family planning, health care, infant and child survival rates, literacy and education and improvement of the economic and social status.

#### D. CHINA

China is the most populous country in the world. In 1994, the world population was estimated at 5.7 billion people with 1.2 billion in China.<sup>160</sup> In 2025, approximately 8.3 billion people will inhabit the earth with 1.5 billion in China.<sup>161</sup>

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1992 drought in Africa was the worst in a century. Approximately 2.6 million square miles were scorched, and 20 million people faced hunger, poverty and disease.

157. *Commentary*, *supra* note 147, at 631.

158. John Darnton, *Report Ties Smoking to Epidemic of Death*, N.Y. TIMES, Sept. 21, 1994, at A16.

159. Seventy percent of Chinese men smoke 15 cigarettes a day, and throughout Latin America and East Asia, one in two men smoke.

160. *The World Population, Now and in the Future*, N.Y. TIMES, Sept. 11, 1994, at A6. For a discussion on population distribution in China, see WORLD MARK ENCYCLOPEDIA OF THE NATIONS ASIA & OCEANIA 54-5 (1984).

161. *Id.* China experienced enormous population growth in the 1950s and 1960s. The Chinese government has implemented policies impacting family planning, migration, marriage, and employment. The policies plan to:

1. Raise public awareness with a wide range of publicity programs that explain the importance and necessity of population control.
2. Regulate family planning so that couples limit family size, for example, to only one child. Government incentives and a family planning responsibility system will aid in implementation.
3. Reduce incentives for childbirth by alleviating concern for old-age care with a comprehensive social security system, guaranteeing women's health with a medical insurance system, and providing adequate contraceptive devices.
4. Promote sustainable birthrates and nursing to improve overall population "quality by prohibiting marriage between close relatives and actively promoting children's education.

GU GEPING & LI JINCHANG 1-3 (Robert B. Boardman ed., 1994). For a discussion on gender issues in the context of Chinese population control, see Sharon K. Hom, *Female Infanticide In China: The Human Rights Specter and Thoughts Towards (An)other Vision*, 23 COLUM. HUM. RTS. L. REV. 249

Despite human rights abuses<sup>162</sup> and a tremendous population, China receives American investments and incentives. Its population size is perceived as an asset.<sup>163</sup> China is advertised as having more than a billion people and the world's third-largest economy. Consequently, it represents a wealth of investment opportunities because it has the biggest potential growth market in the world.<sup>164</sup> China hosts all the "Big Eight" accounting firms.<sup>165</sup> In Beijing, hundreds of thousands of people work for foreign companies.<sup>166</sup> AT&T, in conjunction with Chinese interests, enjoyed \$81 million in sales in China.<sup>167</sup> Other companies in China include Boeing and General Electric.<sup>168</sup> In Shanghai, alone, there are 200 U.S. investors.<sup>169</sup> Despite international and American calls to curb population growth, China appeals to American big business because of its tremendous population.

Efforts by China to limit its population are denounced in the United States federal courts. In *Guo Chun Di v. Carroll*,<sup>170</sup> the court held that persons subjected to China's population control policies are eligible for asylum in the United States. The petitioner in this case was a twenty-eight year old citizen of the People's Republic of China (PRC). After the birth of his first child, Chinese government family planning officials ordered his wife to report to a local hospital for a sterilization operation. She refused and fled to another city. The government then ordered the petitioner to report to a hospital for a sterilization operation. He too fled and eventually arrived in the United States. The Immigration and Naturalization Service (INS) charged him with entering the United States in violation of federal law because he lacked valid documentation.

The petitioner asserted a claim for political asylum and was transferred to

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(1992). For a discussion of the human rights implications of China's one-child policy, see Jeannie A. Clarke, *The Chinese Population Policy: A Necessary Evil?*, 20 INT'L L. & POL. 321 (1987); see also Lisa B. Gregory, Note, *Examining the Economic Component of China's One-Child Family Policy Under International Law: Your Money or Your Life*, 6 J. CHINESE L. 45 (1992).

162. See, e.g., Patrick E. Tyler, *Leaders Crack Down on Calls for Democracy*, N.Y. TIMES, Mar. 7, 1994, at A8.

163. James Russel, *New China is an Investing Opportunity*, MIAMI HERALD, Mar. 6, 1994, at K1; see also Thomas L. Friedman, *Looking to Asia, Bentsen Sees History in Making*, N.Y. TIMES, Mar. 19, 1994, at A39; Joseph Kahn, *China to Double Stocks that Foreigners May Buy In Bid to Attract Big Players Like Mutual Funds*, WALL ST. J., May 13, 1994, at C12.

164. GEOFFREY MURRAY, *DOING BUSINESS IN CHINA, THE LAST GREAT MARKET* (1994); Ken Mark, *Orient Express*, CAL. MAGAZINE, May 1994, at 22.

165. *Id.* at 24.

166. Joyce Barnatham et al., *China: Is Prosperity Creating a Freer Society?*, BUS. WK., June 6, 1994, at 98.

167. William S. Ellis, *Shanghai: Where China's Past and Future Meet*, NAT'L GEOGRAPHIC, Mar. 1994, at 28.

168. Joe Klein, *'Hard' vs. 'Soft' vs. 'Viral' Power*, NEWSWEEK, June 6, 1994, at 39.

169. Steven Strasser, *Playing Chinese Chicken*, NEWSWEEK, Mar. 21, 1994, at 42.

170. 842 F. Supp. 858 (E.D. Va. 1994).

a detention center pending a hearing. At the hearing, he testified as follows:

Q. And can you say exactly why you wanted to leave China?

A. Because I feared that China has no freedom. Because I only have one child, I want to have two more child, but they don't let me have. If . . . I afraid that if they find me, they will took me to get sterilize operation.

Q. Why did you want to come to the United States instead of some other Country?

A. Because I heard about the U.S.A. is a freedom country.

Q. What do you think would happen to you if you were sent back to China

A. They . . . first they will sent me to the jail and then they will force me to do the sterilize operation.<sup>171</sup>

The immigration judge found that the petitioner was not a refugee and was therefore ineligible for asylum. The Board of Immigration Appeals rejected petitioner's appeal. However, the Federal District Court decided that the petitioner was a refugee.<sup>172</sup> Under the Immigration and Nationality Act, a refugee is a person who has a well-founded fear of persecution on account of race, religion, nationality, membership in a particular group, or political opinion.<sup>173</sup> The court relied upon *Huaman-Cornelio v. Board of Immigration Appeals*<sup>174</sup> in stating that whether a person has a well-grounded fear of persecution is determined by using a reasonable person test.<sup>175</sup> The court held that petitioner's fear of sterilization was reasonable and that political opinion encompasses an individual's views regarding procreation because the right to bear children is a basic human right. As a result of the court's decision, a citizen of the PRC is eligible for asylum in the United States to avoid the PRC's policy of involuntary sterilization to control population growth.

The population problem is exacerbated further by sending millions of dollars to Africa for military aid<sup>176</sup> while providing \$23 billion in loans and investments to China to build factories for economic development.<sup>177</sup> In 1992, foreign investment in Indonesia alone exceeded total investment in sub-Saharan Africa.<sup>178</sup> Third World countries spent \$125 billion on arms and a mere \$57 billion on human development, with 86% of their weapon

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171. *Id.* at 862.

172. Asylum requires classification as a refugee under 8 U.S.C.A. § 1158(a) (Supp. 1994). The section provides: "The Attorney general shall establish a procedure for an alien physically present in the United States or at land border or port of entry, . . . and the alien may be granted asylum . . . if the Attorney General determines that such alien is a refugee . . ." *Id.*

173. 8 U.S.C.A. § 1101(a)(42)(A)(Supp 1994).

174. 979 F.2d 995 (4th Cir. 1992).

175. *Guo Chun Di*, 842 F. Supp. at 871.

176. Geraldine Brooks, *Africa's Newest Nation, Little Eritrea Emerges As an Oasis of Civility*, WALL ST. J., May 31, 1994, at A1 (noting the million dollars given to Ethiopia for military aid).

177. Steven Greenhouse, *Third World Markets Gain Favor*, N.Y. TIMES, Dec. 17, 1993, at C1.

178. Peter Lewis, *Politics of Economics*, AFR. REP., May-June 1994, at 47.

purchases from the United States, France, Britain, China and Russia.<sup>179</sup> Consequently, Africa's exports reflect dwindling shares of world markets because commercial lenders continue to shun African borrowers, and private investors are reluctant to invest in Africa.<sup>180</sup> These lenders and investors perceive sub-Saharan Africa as lacking economic feasibility for investment.<sup>181</sup> In 1990 investment in sub-Saharan Africa constituted a mere 0.46% of total U.S. investments abroad.<sup>182</sup> U.S. investment in Africa decreased as the rates of return on foreign investments in Africa decreased due to deteriorating infra-structures and communications, poorly skilled workers, debt and foreign exchange rates.<sup>183</sup>

International markets are generally disfavorable to African products. Prices have fallen for sugar, diamonds, coffee, cocoa and cotton.<sup>184</sup> Fallen prices exacerbate Africa's environmental problems. Africa is dependent upon commodity exports — natural raw materials and cash crops. Thus, when prices declined, African nations increased their production of raw materials and cash crops. This excess depresses the value of such products and eventually impacts the natural environment resulting in soil erosion, deforestation and decertification. In effect, the failure of industrialized nations to invest in Africa fosters and perpetuates poverty which in turn causes further environmental degradation.

### III. PARTICULAR ENVIRONMENTAL CONCERNS

It is problematic for industrialized countries to assert that Third World countries should stop cutting down trees to reduce global warming while

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179. *Update*, AFR. REP., July-August 1994, at 6.

180. Lewis, *supra* note 178, at 47.

181. For an economic outlook on Africa regarding GNP, debt load, and economic growth, see John Darnton, *In Decolonized, Destitute Africa, Bankers are the New Overlords*, N.Y. TIMES, June 20, 1994, at A1, A6. Also, there has been a recent trend by the World Bank and others to combine environmental matters with loan processes. Stephanie C. Guyett, *Environment and Lending: Lessons of the World Bank, Hope for the European Bank for Reconstruction and Development*, 24 N.Y.U.J. INT'L L. & POL. 889, 895, 897-901 (1992); Catherine A. O'Neill & Cass R. Sunstein, *Economics and the Environment: Trading Debt and Technology for Nature*, 17 COLUM. J. ENVTL. L. 93, 107 (1992); *World Bank Details \$2.4 Billion in Lending for 1994 Projects*, INT'L BUS. & FIN. DAILY (BNA), Sept. 21, 1994, at D-7.

182. Marguerite Michaels, *Retreat from Africa*, 72 FOREIGN AFF., 93 (1993). For attempts by African countries to reform their economies, see *Thomas Friedman v. Africa's Economics: Reforms Pay Off*, N.Y. TIMES, Mar. 13, 1994, at A4.

183. Investments may trigger economic reforms that stress privately owned lands, which in turn could lead to a reduction in population. *Population Misconceptions*, 331 ECONOMIST 83 (May 28-June 3, 1994).

184. Economic Commission for Africa, *Survey of Economic and Social Conditions in Africa, 1987-1988* (24th Session of the Commission and 15th Meeting of the Conference of Ministers, Addis Ababa, Ethiopia March-April 1989) UN Doc E/ECA/CM.15/3/Rev.2, UN Sales No. E.90.II.K.1. (1990).



industrialized countries ignore the problems associated with mining, hazardous waste, pesticides, technology and risk perception and the affect of these activities on the natural environment.

Efforts to establish cooperation between Third World and industrialized countries to abate environmental degradation must address the particular environmental concerns of the Third World.<sup>185</sup> For example, Ghana's environmental issues typify the environmental concerns of Africa in general. These issues include soil degradation, deforestation, water contamination, inadequate sanitation and exploitive mining activities. These create numerous health problems.<sup>186</sup>

In Africa, mineral exports constitute more than half of all foreign exchange earnings.<sup>187</sup> Annual mineral production for the sub-Sahara African countries of Angola, Botswana, Lesotho, Malawi, Mozambique, Namibia,

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185. For the array of environmental concerns on the African continent, see 37 J. AFRICAN L. 109-176 (1993) (discussing wetland concerns in Uganda, land issues in Tanzania, and forest preservation and rights of cocoa farmers in Western Ghana); Korinna Horta, *Troubled Waters: World Bank Disasters Along Kenya's Tana River*, 15 MULTINATIONAL MONITOR 12 (July/Aug. 1994); Brian J. Nickerson, *The Environmental Laws of Zimbabwe: A Unique Approach to Management of the Environment*, 14 B.C. THIRD WORLD J. 189 (Summer 1994). China's population is adversely impacting the environment. Patrick E. Tyler, *Nature & Economic Boom Devouring China's Farmland*, N.Y. TIMES, Mar. 27, 1994, at A1. Economic boom and natural forces are shrinking China's farmland. Farmers are paving farmland for freeways, factories, shopping centers, golf courses, and villas. Since 1949, the population in China has doubled to 1.2 billion. With such a population food production is vital. Due to severe agricultural crisis, the worst since the start of China's open-door policy, the Chinese government is trying to persuade farmers to grow grain instead of pursuing more profitable activities. Willy Wo-Lap Lam, *Rationing Returns to Cope with Grain Crisis*, S. CHINA MORNING-POST, Dec. 17, 1994, at 9; Peter T. White, *Rice the Essential Harvest*, 185 NAT'L GEOGRAPHIC 48, 54 (May 1994). For a discussion on how China's population impacts upon land, forest, grassland, mineral resources, water and energy, see QU GEPING AND LI JINCHANG (TRANSLATED BY JIANG BAOZHONG AND GU RAN), *POPULATION AND THE ENVIRONMENT IN CHINA* (1994). Industrialization and a growing population of twenty one million has also created a ground water crisis in Taiwan. Jim Hwang, *Water Conservation Resource in Crisis*, 44 FREE CHINA REVIEW 7 (July 1994) (noting that by 2100, Asia will account for one-half of carbon dioxide emissions worldwide). *Asia: Nations Seen Accounting for Half of Global CO2 by 2100*, INT'L ENVTL. DAILY (BNA), Oct. 6, 1994 (observing that such emissions will cause floods, draughts, vegetation changes, and malaria).

186. WORLD BANK, *TRENDS IN DEVELOPING ECONOMICS BY THE WORLD BANK* 199 (1993). Pollution from mining is an international problem. Mining has resulted in environmental and health problems in Germany, Poland, Japan, the Netherlands, and South America. WORLD RESOURCES REPORT 1992-93, *supra* note 142, at 168. A major portion of waste generated in the United States is from mining waste, which is estimated at 2.34 billion tons per year. U.S. mining activities include mining for coal, phosphates, copper, iron, uranium, and other minerals. Robert v. Percival, in ALAN S. MILLER ET AL., *ENVIRONMENTAL REGULATION, LAW, SCIENCE AND POLICY* 204 (1992).

187. Peter C. Acquah, *Mining And The Environment — The Ghanaian Experience* 14 (seminar on the Effect of Mining on Ghana's Environment with particular reference to Proposed Mining Environmental Guidelines) (Peter C. Acquah, ed.) [hereinafter *Ghana Gold Mining*]. Ghana enacted environmental guidelines under the minerals and mining law "to restrict prospecting near any water body, prevent pollution of water, ensure public safety and the safety of workers, prevent pollution of water, prevent injury to persons or property by chemicals and set penalties for offenses against the regulations." GHANA'S MINING AND ENVIRONMENTAL GUIDELINES (Mineral Commission and Environmental Protection Council, ed., 1994).

Swaziland, Tanzania, Zambia and Zimbabwe is estimated at \$4 billion.<sup>188</sup> Mining and other industries in Africa such as diamonds, manganese ore and rubber cause land degradation, pollute water and create health problems.<sup>189</sup> Ghana's Program Officer for Environmental Protection declared:

The gold mining industry is vital to the economy of Ghana, however the treatment of arsenopyritic ores of gold extraction involves a roasting process that leads to the discharge of enormous quantities of arsenic trioxide into the environment. The Ashanti Goldfields Corporation (AGC) is by far the largest gold mining concern in Ghana and it releases about 12 tons of arsenic trioxide daily into the atmosphere as gaseous pollutants. This has led to the contamination of soils within the environs of the smelter.<sup>190</sup>

The gold mining process can involve the use of cyanide to separate gold from slurry. When mixed with water, cyanide becomes a toxic sludge. In South Africa, numerous people died or were injured — some burned by cyanide when toxic sludge produced by gold mining engulfed a housing complex after heavy rains.<sup>191</sup>

Essentially, the critical question becomes: should industrialized nations exploit the gold and minerals of Third World countries in total disregard for the environment, proclaim an interest in the ozone and demand that Third World countries control their population growth?<sup>192</sup>

Industrialized countries must do their part in ensuring the proper disposal and management of hazardous waste to protect the environment and humans. The United States is the leading generator of hazardous waste producing 264 million tons annually.<sup>193</sup> In 1983, hazardous waste was transported once every five minutes, seven days a week, 365 days per year all

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188. 30 AFR. REV. BUS. & TECH. 53 (Nov. 1994).

189. S.B. AKUFFO, POLLUTION CONTROL IN A DEVELOPING ECONOMY: A STUDY OF THE SITUATION IN GHANA 25, 87 (1989).

190. George Manful, *Approaches to Sanitation of Arsenic Contaminated Soils*, in GHANA GOLD MINING, *supra* note 187, at 115.

191. *South Africa: Wall of Toxic Mud Engulfs Homes: 12 Dead*, MIAMI HERALD, Feb. 24, 1994, at 16A.

192. The gold mining industry in the United States generates high-paying manufacturing jobs critical to the U.S. economy. Larry E. Craig, *Mining Act Needs Reform, Not Refrain*, 10:4 ENVTL. F. 30 (1993).

193. James Gustave Speth, *EPA Must Help Lead An Environmental Revolution In Technology*, 21 ENVTL. L. 1425 (1991). Approximately 700,000 tons of toxic waste are produced daily in the United States. In a year's time, the amount generated could fill the New Orleans Superdome 15,000 times. JON NAAR, *DESIGN FOR A LIVABLE PLANET* 38 (1990). The billions of tons of junk mail circulated each year within the United States also contributed to the United States generating enormous amounts of solid waste. Will Nixon, 4 ENVTL. MAG. 30 (Dec. 1993). For an insightful overview on the problem of the use of non-recyclable items in the United States, see Noel Grove, *Recycling*, 186 NAT'L GEOGRAPHIC 92 (July 1994). Materials discarded in space by U.S. flights may also threaten the natural environment. Patrick Turley, *Ozone Depletion: International Protective Strategies and Implications*, 12 UNIV. ARK. LITTLE ROCK L.J. 301 (1989/1990).

over the world.<sup>194</sup> Ninety-eight percent of the 500 million tons of hazardous waste produced each year is produced in industrialized countries and many of these industrialized countries find Africa an attractive dumping ground due to lax laws and corrupt governments.<sup>195</sup>

#### A. PESTICIDES

Efforts to address global warming and population growth must include broader environmental concerns, particularly when such concerns adversely impact the health of Third World nations. Pesticide use is one such concern.

Pesticide use should become a major environmental issue because it is a worldwide problem. In the United States, the industrialization of agriculture prompted farmers to spray their crops with chemicals which adversely affected both water quality and public health.<sup>196</sup> In Third World countries where genetically engineered cereals supposedly create higher yields, such crops are also sprayed with expensive chemical pesticides. Pesticide use has proven profitable for international business. For example, in the 1980s world trade in pesticides generated \$16 billion in profit for multinational corporations.<sup>197</sup> The approximate annual pesticide use, in metric tons of active ingredients, between 1982 and 1984 in Africa was 65,000, in Central America and Caribbean was 60,000, in South America was 103,000 and in Asia was 297,000.<sup>198</sup>

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194. J.W. MacNeill, *Policy Issues Concerning Transfrontier Movements of Hazardous Waste*, in TRANSFRONTIER MOVEMENTS OF HAZARDOUS WASTE 7 (1985).

195. *West Dumps More Toxic Waste in West Africa*, XINHUA GEN. OVERSEAS NEWS SERVICE, item no. 0626029 (June 26, 1992). For a discussion on the movement of hazardous waste from industrialized countries to Third World countries, see *South Africa: More Than Half The Waste Disposal Sites Examined In Study Found To Be Contaminated*, INT'L ENVTL DAILY (BNA) (Aug. 4, 1993). See also Russel H. Shearer, *Comparative Analysis of the Basel and Bamako Conventions on Hazardous Waste*, 23 ENVTL. L. 141, 145 (1993); see generally Jeffery D. Williams, *Trashing Developing Nations: The Global Hazardous Waste Trade*, 39 BUFF. L. REV. 275 (1991) (discussing hazardous waste disposal and the status of current law governing such waste). For more discussion on exporting waste and a critique of current regulations and conventions, see Barbara D. Huntton, *Emerging Controls on Transfers of Hazardous Waste to Developing Countries*, 21 LAW & POL'Y INT'L BUS. 247 (1989) (discussing regulatory measures taken by developed and developing countries in an attempt to curb waste dumping in developing countries); Kenda Jo M. McCrory, *The International Exportation of Waste: The Battle Against the Path of Least Resistance*, 9 DICK. J. INT'L L. 339 (1991); Peter Obstler, *Toward a Working Solution to Global Pollution: Importing CERCLA to Regulate the Export of Hazardous Waste*, 16 YALE J. INT'L L. 73 (1991).

196. Annette McGiveney, *Troubled Waters*, 4 ENVTL. MAG. 31, 32-4 (Oct. 1993).

197. MIDDLETON, *supra* note 11, at 117.

198. *Id.* at 118-19. The use of chemical pesticides demonstrates that technology may or may not be the answer. If misapplied, technology can worsen an environmental crisis. Raymond S. Larsen, *Running Out of Resources*, 30 IEEE SPECTRUM MONITORING 43, 44 (July 1993).

## B. OBSOLETE TECHNOLOGY

In the United States, ozone depleting refrigerants are regulated.<sup>199</sup> However, what happens to the obsolete refrigerants remains a question. In August 1994, Ghana hosted the Second Ghana Computer and Information Technology Fair. The Computer Fair was held for seven days, and fifty-two computer firms and 6,500 visitors attended. The Ghanaian minister of Environment, Science and Technology cautioned computer dealers to ensure their products were based on 'green or clean' technology. Because most of the companies were displaying old-fashion computer equipment the minister warned against computer dumping in Ghana. She noted, "We have seen such dumping occur in Ghana with respect to ozone depleting CFC refrigerators, freezers and air conditioners."<sup>200</sup>

Currently, Third World countries contribute one-third of greenhouse emissions from land-use changes, deforestation, rice cultivation and live stock. Industrialized countries worry that as Third World countries industrialize they will increase greenhouse emissions. Such an increase may be reduced if Third World countries are no longer used as a dumping ground for obsolete technology whereby old refrigerators, cars and other technology are sold to struggling economies for a profit.

## C. RISK PERCEPTION

Another problem associated with industrialized nations asserting a correlation between population growth and global warming stems from perceptions of risk and environmental threats. The perception of risk differs among and within various racial, ethnic, political and economic groups. In the United States, opinions of what constitutes a major environmental threat differ due to ethnicity and economics.<sup>201</sup>

Racial minorities in the United States tend to perceive hazardous waste as the major environmental problem. Women in the United States believe

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199. Bob Horne, *Protecting Ozone Layer Increases Service Bills*, FAYETTEVILLE OBSERVER, July 11, 1993, at G1. The owner of a St. Louis car repair shop was prosecuted for allowing the refrigerant from a car's air conditioner to leak into the air. Matthew L. Wald, *First Prosecution Under Ozone-Protection Law*, N.Y. TIMES, May 13, 1994, at A8 (noting the first person to be convicted under the federal Clean Air Act).

200. *Ghana Show Highlights Challenges: Kufi Asante Review the Second Computech Show Held in Accra*, AFR. REV. BUS. & TECH. 15 (Nov. 1994).

201. For a discussion on how racial minorities are environmentally discriminated against in facility siting decisions, see Omar Saleem, *Overcoming Environmental Discrimination: The Need for a Disparate Impact Test and Improved Notice Requirements in Facility Siting Decisions*, 19 COLUM. J. ENVTL. L. 211 (1994). See also Elaine Vaughan & Brenda Nordensta, *The Perception of Environmental Risk Among Ethnically Diverse Groups*, 22 J. CROSS-CULTURAL PSYCHOL. 38 (Mar. 1991).

consumer trash is the most important environmental issue followed by air and water quality and ozone depletion.<sup>202</sup> The EPA also ranks environmental risk, and its rankings differ from rankings by the general public.<sup>203</sup> For the general public chemical waste disposal and water pollution are the major concerns, while the EPA considers global warming as a major concern.

This difference of opinion about what constitutes a major environmental problem is also seen in the United Kingdom. Although most are concerned about the environment, chemical discharges into rivers and seas are perceived as a more serious problem than global warming.<sup>204</sup> Scientists also differ about the cause and scope of global warming.<sup>205</sup>

Similarly, when asked to enumerate their primary environmental concerns, Africans stress factors not present among either EPA, the United Kingdom or most Americans. According to a report submitted to the 1992 United Nations Conference on Environment and Development (UNCED) preparatory conference, twenty-two sub-Saharan African countries ranked their environmental problems in the following order, from highest to lowest priority: land resources management, poverty, living conditions of the poor, drought, deforestation, desertification, biotechnology, human health, land degradation, irrigation water, biological diversity, fresh water resources, coastal areas protection, hazardous wastes, toxic wastes, acid rain, climate change, seas and oceans protection, transboundary air pollution and ozone layer depletion.<sup>206</sup> At the population conference held in Cairo in September

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202. Jeff Bailey, *Business Bulletin*, WALL ST. J., Mar. 10, 1994, at A1.

203. See GAO's Analysis of EPA Data reported in Unfinished Business Report; DENNIS GILBERT, COMPENDIUM OF AMERICAN PUBLIC OPINION 124 (1988); I.C. Bupp et al., *Caught in the Muddle: The Dilemma of Today's Electric Power Industry*, 8 NAT. RESOURCES & ENV'T. 3,5 (1994).

204. *United Kingdom: U.K. Survey Finds 85 percent of Public "Concerned" about Environment*, INT'L ENVTL. DAILY (BNA), Sept. 13, 1994.

205. See, e.g., Wilfred Beckerman & Jesse Malkin, *How Much Does Global Warming Matter?*, PUB. INT., at 3, 4 (1994) (environmental uncertainties include timing, scope and severity of effects); Daniel B. Botkin, *Global Warming: What it is, What is Controversial About It, and What We Might Do In Response To It*, 19 J. ENVTL. L. 119, 121-25 (1991) (discussing that many climatologists are skeptical about reliability of global warming forecasts); John H. Gibbons, *Energy and the Environment: Intersecting Global Issues Decision-Making in the Face of Uncertainty*, 9 ARIZ. J. INT'L & COMP. L. 232, 235-236 (1992); Susan E. Holley, *Global Warming: Construction and Enforcement of An International Accord*, 10 STAN. ENVTL. L.J. 44 (1991) (noting that controversy exists over the degree and nature of global warming); Lori M. Rodgers, *International Representatives Discuss Global Warming — Possible Consequences and Solutions*, PUB. UTIL. FORTNIGHTLY, Mar. 15, 1990, at 39 (observing that there is no consensus on the degree and direction of global warming change); *Ozone Depletion: U.K. Report Says Ozone Losses in Europe Rising, Will Become Worse*, INT'L ENVTL. DAILY (BNA) (Feb. 1, 1994) (questioning the previous assumptions on upper and lower atmospheric ozone and greenhouse gases). There have been international efforts to reach a consensus and address the problem of global warming. Winfried Lang, *Is the Ozone Depletion Regime a Model for an Emerging Regime on Global Warming?*, 19 J. ENVTL. L. 161, 168 (1991); *Climate Change: Panel Says Scientific Consensus on Global Climate Reached in 1990 Still Holds True Today*, INT'L ENVTL. DAILY (BNA), Sept. 15, 1994.

206. Ewah Otu Eleri, *Africa's Decline and Greenhouse Politics*, 6 INT'L ENVTL. AFF. 133, 142

1994, African countries also stressed factors of debt, devaluation, refugees, structural adjustment and limited resources with respect to the population growth issue.<sup>207</sup>

#### D. AIR POLLUTION — CAUSES AND BACKGROUND

Air pollution is generally viewed as a relatively new environmental concern. This is an inaccurate perception.<sup>208</sup> Air pollution dates back to smoke-charred prehistoric cave dwellings.<sup>209</sup> Official concerns about air pollution apparently began in the Middle Ages. In 1157 the wife of King Henry II could not tolerate the air pollution caused by wood burning and was forced to move.<sup>210</sup> In 1272 King Edward I of England banned the use of sea coal because of the smoky London skies.<sup>211</sup> In 1306 he decreed "all but smiths eschew the obnoxious [burning of coal] and return to the fuel they used of old."<sup>212</sup> In 1661, English scientists began noting a causal connection between air pollution and health, which led them to suggest moving industry outside of towns and constructing higher smokestacks to better disperse the smoke.<sup>213</sup> A later study advanced a causal connection between deteriorating air quality in London, caused by increased reliance on coal, and mortality rates.<sup>214</sup>

The Industrial Revolution caused a dramatic increase in air pollution.<sup>215</sup> The carbon dioxide concentration in the atmosphere prior to the Industrial Revolution was 280 parts per million. However, since 1900 that amount has

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(1994). The countries drew a correlation between people, poverty and land resources. Poverty is both cause and outcome of environmental degradation.

Those who are poor and hungry will often destroy their immediate environment in order to survive. They will cut down forests; their livestock will overgraze grasslands; they will overuse marginal land; and in growing numbers they will crowd into congested cities. The cumulative effect of these changes is so far-reaching as to make poverty itself a major global scourge.

Ved P. Nanda, *Developed Countries Assistance to the Developing World for Environmental Protection*, 1 KANSAS J. L. & PUB. POL'Y 27 (1991) quoting THE WORLD COMMISSION ON ENVIRONMENT AND DEVELOPMENT: OUR COMMON FUTURE 2 (1987). Solving world environmental problems must go hand in hand with solving poverty. CREATING A NEW WORLD ECONOMY FORCES OF CHANGE PLANS FOR ACTION 1 (Gerald Epstein et al. eds., 1993).

207. Yvette Collymore, *Short Shift for Africa*, 39 AFR. REP. 43 (1994).

208. Gordon L. Nelson, *Effects of Carbon Monoxide in Man: Exposure Fatality Studies*, in CARBON MONOXIDE AND HUMAN LETHALITY 3 (Marcelo M. Hirscheller ed., 1993).

209. JON NAAR, DESIGN FOR A LIVABLE PLANET 77 (1990).

210. ELIZABETH M. WHELAN, TOXIC TERROR 196 (1993).

211. K. WARK & C.F. WARNER, AIR POLLUTION: ITS ORIGIN AND CONTROL (2nd ed. 1981), reprinted in MARK SQUILLANCE, ENVIRONMENTAL LAW VOLUME THREE: AIR POLLUTION 1 (2d ed. 1992).

212. Elliott P. Laws, *The Regulation of Statutory Sources*, in CLEAR AIR LAW AND REGULATION 149, 150 (Timothy A. Vanderver, ed., 1992).

213. JOHN FIROR, THE CHANGING ATMOSPHERE: A GLOBAL CHALLENGE 7 (1990).

214. *Id.* at 9.

215. Laws, *supra* note 212, at 1.

increased 25%.<sup>216</sup> The momentum generated by the Industrial Revolution, which championed industrial development at any cost, quashed or outright ignored any protests against this devastating environmental change.<sup>217</sup> The Industrial Revolution introduced pollution from mobile sources, and the use of oil and coal worsened the air pollution problem. Industrialization precipitated disparities of wealth, exacerbating urban poverty and increasing pollution.<sup>218</sup>

In the United States, air control laws were passed in Chicago and Cincinnati in 1881.<sup>219</sup> By approximately 1912, most American cities had enacted smoke control laws. Nevertheless, between the 1930s and 1950s, smoke pollution in the United States increased to unprecedented levels. As a result, in 1955 the first federal clean air legislation was enacted.<sup>220</sup> It was later deemed ineffective and replaced by the Clean Air Act of 1963.<sup>221</sup> Congress amended the Clean Air Act in 1970<sup>222</sup>, 1977<sup>223</sup>, and 1990<sup>224</sup>. The purpose of the Clean Air Act is to provide for the protection and enhancement of air quality through the regulation of pollutant emissions and the establishment of air quality standards.<sup>225</sup> The rationale for the control of air is based upon certain basic assumptions. Air is in the public domain; air pollution is an inevitable concomitant of modern life; scientific knowledge can be applied to the shaping of public policy; methods of reducing air pollution must not increase pollution in other sectors of the environment.<sup>226</sup> Air pollution in the United States exists in numerous forms and is generally a product of waste caused by combustion. The EPA has classified pollutants as particulate matter, sulfur-containing compounds, organic compounds, nitrogen-containing compounds, carbon monoxide, halogen compounds and radioactive compounds.<sup>227</sup> Sources of these compounds include transportation

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216. James Gustave Speth, *EPA Must Help End An Environmental Revolution in Technology*, 21 ENVTL. L. 1425 (1991).

217. FRANK P. GRAD, *TREATISE ON ENVIRONMENTAL LAW* § 2.01 (1973).

218. MICHAEL SILVERSTEIN, *THE ENVIRONMENTAL ECONOMIC REVOLUTION* 168 (1993).

219. *Id.*; see also DAVID P. CURRIE, *POLLUTION CONTROL CASES AND MATERIALS* (1975).

220. Act of July 14, 1955, ch. 360 (research and technical assistance for air pollution control) (codified as amended at 42 U.S.C. § 1857 (1955)).

221. Clean Air Act, Pub. L. No. 88-206, 77 Stat. 392 (1963).

222. Pub. L. No. 91-604, 84 Stat 1676 (1970).

223. Pub. L. No. 95-95, 91 Stat 689 (1977).

224. Pub. L. No. 101-549, 104 Stat. 2399 (1990). For a discussion on the origins of the Clean Air Act, see WILLIAM H. RODGERS, *ENVIRONMENTAL LAW: AIR AND WATER* § 3.1 (1986). For a discussion of how each amendment affected the Clean Air Act regulatory program, see Laws, *supra* note 212, at 154. For a discussion on how the 1990 amendments affect small businesses and broaden the list of air toxins, see Kathleen Laufenberg, *State '911' Phone-line Handles Small Businesses' Enviro Problems, Questions*, FLA. ENVIRONMENTS, Nov. 1993, at 3 (discussing how the recent 1990 amendments affect some small businesses and broaden the list of air toxins).

225. Clean Air Act, Pub. L. No. 88-206, 77 Stat. 392 (1963).

226. WARK, *supra* note 211, at 2.

227. *Id.* at 3.

exhaust, industrial processes, stationary fuel combustion and solid waste.<sup>228</sup>

Although air quality in the United States improved between 1975 and 1987,<sup>229</sup> air pollution outside of the United States did not improve at a similar rate. Cities such as Madrid, Paris, and Milan have worse sulfur dioxide emissions than New York.<sup>230</sup> In addition, developing nations have particular emissions problems arising from the reliance on burning wood or other fossil fuels for heating and cooking needs.<sup>231</sup> Third World energy use has tripled since 1970 due to population growth. Within the next thirty years there could be a 70% increase in current 1993 energy use levels in the Third World.<sup>232</sup> Air pollution has become a transnational concern. However, that is only part of the problem. The United States relies heavily upon fossil fuels such as oil, coal and natural gas. While the U.S. population constitutes merely 5% of the total world population, the United States consumes 25% of the world's energy.<sup>233</sup> The industrialized nations of the world, including the United States, account for two-thirds of all greenhouse gas emissions.<sup>234</sup> Approximately three million energy consumers are added to the U.S. population each year. Ironically, 58% of federal subsidies for the energy sector are directed to promote use of fossil fuels.<sup>235</sup>

Some greenhouse gases occur naturally in the atmosphere. However, since the Industrial Revolution, atmospheric concentrations of carbon dioxide and chlorofluorocarbons (CFCs) and other greenhouse gases have increased due to the burning of fossil fuels and other human activities in industrialized countries.<sup>236</sup> It is predicted that by the year 2030, the amount of carbon dioxide in the atmosphere will have doubled since the start of the Industrial Revolution.<sup>237</sup> The higher temperatures resulting from this increase in CO<sub>2</sub> content could have a major and adverse impact on

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228. WHELAN, *supra* note 210, at 318-19.

229. MARTIN FREEDMAN & BIKKI JAGGI, AIR AND WATER POLLUTION REGULATION ACCOMPLISHMENTS AND ECONOMIC CONSEQUENCES 9 (1993); *see also* ALLEN V. KNEESE & CHARLES L. SCHULTZE, POLLUTION, PRICES AND PUBLIC POLICY vii (1975) (discussing pollution control efforts and the costs and enforcement difficulties of legislation).

230. FREEDMAN, *supra* note 229, at 16.

231. Sulfur dioxide is a colorless gas created by fossil-fuel combustion. When mixed with water in the atmosphere it produces sulfuric acid. SYBIL B. PAPER, MCGRAW-HILL DICTIONARY OF SCIENTIFIC AND TECHNICAL TERMS 1854 (4th ed., 1989); MCGRAW-HILL ENCYCLOPEDIA OF SCIENCE & TECHNOLOGY 594-95 (7th ed., 1992).

232. 25 THE ZPG REPORTER 1 (Oct/Nov 1993).

233. *Id.*

234. Gibbons, *supra* note 205, at 233. According to the group Greenpeace: "A doubling of greenhouse gases anticipated in the next 30 to 50 years will eventually result in the destruction of 50 percent to 90 percent of the world's northern boreal forest." *Forests: Doubling of Greenhouse Gases Will Destroy Most of World's Boreal Forests*, INT'L ENVTL. DAILY D-3 (Sept. 14, 1994).

235. Gibbons, *supra* note 205, at 235.

236. Norman Myers, *What Ails the Globe?*, 24 INT'L WILDLIFE 34 (1994).

237. WILLIAM WEINER, DAVID S. FAURE, AND SUDHIR CHOPRA, INTERNATIONAL ENVIRONMENTAL LAWS 9-1 to 9-2 (1993).



agricultural productivity, fresh water availability, forest size and sea levels. The higher temperatures cause coastal flooding, shoreline erosion, inundation of wetlands and salinization of estuaries and aquifers.<sup>238</sup> In addition, global climate change causes the loss of 150 species per day.<sup>239</sup>

Industrialized countries contribute most to air pollution and its related problems. The U.S. approach to reducing carbon dioxide poses serious problems and concerns. For example, in China, efforts to develop have resulted in construction of numerous coal-fired plants.<sup>240</sup> In response, the United States has pushed for a reduction and stabilization of current carbon dioxide emissions. Should China and other Third World nations freeze development to resolve a problem created primarily by the industrialized world?<sup>241</sup> For centuries, industrialized countries cut down forests and burned massive amounts of fossil fuels without regard to environmental impact.<sup>242</sup> Furthermore, energy use is directly linked to climate change, and developing countries consume less energy than developed countries. Although Third World countries constitute three-fourths of the total world population, the industrialized countries consume 70% of the world's energy, 75% of its metal, 85% of its wood and 60% of its food.<sup>243</sup> Average per capita energy consumption in millions of tons (including solids, liquids, gaseous and hydro nuclear) worldwide rank as follows: United States (2278.10), Former USSR (1797.16), China (808.50), Japan (440.17), West Germany (344.54), United Kingdom (302.25), Canada (249.07), France

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238. *Id.* Climate change may contribute to skin cancer, spread of infections, and other serious health problems. A.J. McMicheal, *PLANETARY OVERLOAD GLOBAL ENVIRONMENTAL CHANGE AND THE HEALTH OF HUMAN SPECIES* (1993). The EPA has begun conducting studies on the "potential consequences of climate change on human health, coastal zones, water resources, agriculture, forestry, biodiversity and energy use . . . ." *Climate Change: Draft Report by EPA to Examine Economic Impact of Avoidance Measures*, NAT'L ENVTL. DAILY (BNA) D-9 (Feb. 1, 1994). Furthermore, increased temperatures will cause the sea level to rise which in turn will adversely affect the one-third of the world's population which lives within 36 miles of a coast. JOHN-MARK STENSVAAG, *CLEAN AIR ACT: LAW AND PRACTICE* VOL. 1 (1991).

239. Tracy Dobson, *Loss of Biodiversity: An International Environmental Policy Perspective*, 17 N.C. J. INT'L L. & COMM. REG. 277 (1992).

240. TRENDS IN INTERNATIONAL ENVIRONMENTAL LAW 3 (1992).

241. *Id.*

242. Historically, the United States inappropriately separated economic development from ecological consequences. J. William Futrel, *Law of Sustainable Development*, ENVTL. F., Mar./Apr. 1994, at 16-21. In a measurement of economic progress, the loss or impact on natural resources is not part of the equation. Nancy Hass, *The Greening of Economics*, NEWSWEEK, May 16, 1994, at 47. The former Soviet Union, in its efforts to industrialize, ignored the welfare of its citizens and the natural environment. Mike Edwards, *Pollution In the Former U.S.S.R. Lethal Legacy*, 186 NAT'L GEOGRAPHIC 70 (1994). The World Commission On Environment and Development has indicated that the environment and economic development are inextricably linked in a complex system of cause and effect. Ranee Khooshie Lal Panjabi, *From Stockholm to Rio: A Comparison of The Declaratory Principles of International Environmental Law*, 21 DENV. J. INT'L L. & POL'Y 215 (1993).

243. Bing Ling, *Developing Countries and Ozone Layer Protection: Issues, Principles and Implications*, 6 TUL. ENVTL. L.J. 91 (1992).

(212.78), India (210.19), Italy (184.16), Poland (176.15), Brazil (105.35), South Korea (68.17), and Thailand (23.56).<sup>244</sup>

Development must coexist with environmental protection. A concept of sustainable development is appropriate. Sustainable development is defined as "a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development, and institutional change are all in harmony and enhance both current and future potential to meet human needs and aspirations."<sup>245</sup>

#### E. TECHNOLOGY TRANSFER

Third World nations are also concerned with technology-transfer issues. For example, Singapore, with a population of 2.8 million people, is a former British colony. Since independence in 1965, Singapore has undergone a transformation to become an industrialized nation with strength in manufacturing, services and finance.<sup>246</sup> The transformation occurred as a result of acquisition, development and application of technology.<sup>247</sup> Efforts were undertaken by Singapore and foreign investors, including the United States, to enhance key technology areas in Singapore. These technology areas include micro electronics, electronic systems, manufacturing technology, material technology, energy, water, environment and resources, biotechnology, food and agrotechnology and medical sciences.<sup>248</sup> Science and technology can address the problems of global warming, ozone depletion, acid rain, food production, resources and energy and population growth. Thus, technology is part and parcel of economic development.<sup>249</sup> For instance, the installation of telecommunication systems in Africa would diminish carbon dioxide concentrations affecting climatic change. CFCs and lead emissions from vehicular traffic contribute to climatic change.<sup>250</sup> A better

244. Zhou Dadi, *Environmental Considerations In The Economic Development of China*, 9 ARIZ. J. INT'L AND COMP. L. 221, 225 (1992).

245. Christoher Wendel, *supra* note 25, at 169.

246. Khoo Lee Men, *Acquisition and Application of Foreign and Indigenous Technology — The Singapore Experience*, in DEVELOPMENT AND TRANSFER OF INDUSTRIAL TECHNOLOGY 197 (O.C.C. Lin et al. eds., 1994).

247. *Id.* at 199 (noting that such technology included consumer electronics, semiconductors, disk drives, computer/peripherals, pharmaceuticals, petroleum products, and chemical paints).

248. *Id.* at 208; TRENDS IN DEVELOPING ECONOMIES, *supra* note 186, at viii (suggesting that as Third World economies grow they will pose serious challenges to the environment due to increased industrial pollution, deforestation, and depletion of water resources).

249. Kozo Lizuka, *Innovation & Transfer of Industrial Technology Experience and Problems of Japan*, in DEVELOPMENT & TRANSFER OF INDUSTRIAL TECH. 86-88 (O.C.C. Lin et al. eds. 1994). The economic system becomes borderless and global due to science and technology. The industrial countries indifference to the Third World's interest in technology transfer has proven detrimental to both the industrialized and Third World countries. ROGER FISHER & WILLIAM URY, GETTING TO YES NEGOTIATING AGREEMENT WITHOUT GIVING IN 26 (1991).

250. A.M. MANNION, GLOBAL ENVIRONMENTAL CHANGE: A NATURAL AND CULTURAL ENVIRONMENTAL

telecommunication system in Third World countries would reduce vehicular traffic because instead of driving for personal and business reasons, residents would be able to use the telephone. Less traffic on the roads would reduce pollution.<sup>251</sup> Several progressive countries have been able to leapfrog stages of economic development by developing advanced communications systems.<sup>252</sup>

Telecommunications systems are part of a vast and rapidly growing computer technology. Such technology can be used in banking, income taxes, businesses, hospitals, libraries, schools and agriculture in Third World countries. For example, in India, computers are used in agriculture for flood forecasting, railway transportation and reservation systems.<sup>253</sup> In Zimbabwe, computers are used to get fertilizers and agrochemicals to farmers. Without computers, such orders, which amount to 1,000 a day for a population of eight million, would not reach their destination.<sup>254</sup> Though useful, computers will not solve the economic problems of the Third World. A national strategy with planned development is needed. In developing a computer-based society Third World countries must acknowledge:

- (a) There exists a level of development and resources below which computers are of less importance than essential products such as food, clothing and drugs.
- (b) At some point the machine may well be justified as a means of evaluating as accurately as possible the [country's] needs, and for optimizing resource utilization.
- (c) Even then, highest priority must still be put on educating doctors, administrators, agricultural specialists, engineers and other specialists whose talents are immediately applicable and desperately needed.<sup>255</sup>

In effect, a population increase or decrease must be part and parcel of an economic development strategy with a priority on people, education, health, empowerment of women and family planning services.<sup>256</sup>

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HISTORY 152 (1991) (Chlorofluorocarbons are used in refrigeration, air conditioning, aerosol spray, solvents. As industrial countries discard old refrigerators and cars which use leaded gasoline, they continue to ship such obsolete items to Third World countries for economic gain and simultaneously accuse them of destroying the ozone layer.).

251. Richard L. Ottinger, *Energy and Environmental Changes for Developed and Developing Countries*, 9 PACE ENVTL L.R. 55 (1991).

252. Pete Engardio, *Third-World Leapfrog*, BUS WK., June 6, 1994, at 47 (observing that cellular technology is the most popular way to quickly establish a phone system).

253. K. Korsah, *THE COMPUTER REVOLUTION: ITS IMPACT AND APPLICATION TO NATIONAL RECONSTRUCTION* 16-18 (An inter-faculty lecture delivered at the University of Ghana, May 21, 1987 — Ghana University Press, Accra 1988).

254. *Id.* at 19.

255. John R. Koster, *COMPUTERS — AID TO DEVELOPMENT OR PART OF THE PROBLEM ?*, at 6 (Inaugural Lecture Delivered at the University of Ghana, Legon, Jan. 15, 1976).

256. STATE OF WORLD POPULATION 1994, *supra* note 8, at 47.

Population growth alone does not limit economic growth because some of the most crowded places on earth, Hong Kong, Singapore and Taiwan have high rates of economic success.<sup>257</sup> Conversely, Bangladesh has achieved fertility decline in the past two decades; the average number of births for women declined from 7 to 4.5. However, despite falling fertility rates, Bangladesh had not achieved social and economic improvements.<sup>258</sup> The lack of economic development in Bangladesh illustrates that Third World countries must, in addition to any efforts to reduce population growth, improve their infra-structural services which include transportation, utilities, banking and telecommunications.<sup>259</sup>

Another aspect of the role of technology is seen in how Los Angeles improved its air quality in recent years. Since 1950, the population of Los Angeles has tripled (from 4.8 million to 14 million) and the number of motor vehicles on the road quadrupled from 2.3 million to 10.6 million. Despite such tremendous population growth, air quality in Los Angeles improved during the past two decades due to technical innovation and sound social policy.<sup>260</sup>

#### IV. CONCLUSION

Any solutions to population growth and global warming must consider the vast intricacies of life in the Third World. In advancing population control, industrialized countries must consider religion and the particular concerns of Third World nations. This is essential in order to facilitate meaningful dialogue and create or adopt usable solutions to serious environmental problems.

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257. Marcus Gee, *Surprise The World Gets Better*, 41 WORLD PRESS REVIEW 18, 19 (1994).

258. John F. Burns, *Bangladesh, Still Poor, Cuts Birth Rate Sharply*, N.Y. TIMES, Sept. 13, 1994, at A5 (discussing that advocates of reducing Third World population should consider the benefits of alternatives to fossil fuel before alleging that, although industrialized countries still contribute to the bulk of greenhouse gas emissions, the share of emissions by Third World countries will rise with population growth and increasing consumption. For example, Professor Daniel Kammen of Princeton University proved that solar ovens in Southern Kenya reduced respiratory infections, improved nutrition levels, saved wood, and eliminated greenhouse gas emissions. Surely, if solar technology powered the Hubble space telescope, it may have other possible worldly applications. It is estimated that renewable energy technology, such as solar energy, would benefit 2.2 billion people worldwide who currently lack access to electricity. In addition, access to such technology would provide a lucrative market for U.S. companies seeking overseas investments. There have been major breakthroughs in alternative fuel involving fuel cells, electric vehicles, renewable fuel, photovoltaics, and natural gas which, among other uses, depict a bright future for low-emission vehicles and stationary sources.).

259. Dr. K.V. Swaminathan, *Technology Transfer through Foreign Investment*, in UNCTAD, TECHNOLOGY TRANSFER & DEVELOPMENT IN A CHANGING INTERNATIONAL ENVIRONMENT: POLICY CHALLENGES & OPTIONS FOR COOPERATION 5-9 UN. Doc. UNCTAD/ITP/TEC/21 (1992).

260. For a discussion of such policy, see James M. Lents and William J. Kelly, *Clearing the Air in Los Angeles*, SCIENTIFIC AMERICAN, Oct. 1993, at 32.

