The Adequacy of World Soil Resources

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The USA, western Europe, and a few other parts of the world now have record food surpluses (Insel, 1985), even though pockets of famine continue to persist in several African countries and chronic malnutrition exists in other developing countries.

World food production has increased 22.8% in less than a decade (FAO, 1984), with the greatest increases occurring in Asia (35.4%) and South America (31.5%), and the smallest increases in Europe (18.0%) and Africa (15.7%). Food production per capita, though, has only increased by 2.0% in the last 8 years worldwide (Brady, 1985). More importantly, this small increase is not uniform. Africa, for example, had an 11.6% decline in food production per capita. Forty-seven of 90 developing countries had growth rates in agriculture below those of population increase, 28 of them in Africa (Alexandratos et al., 1983).

With projected populations to the year 2110 and all arable land in production, the number of persons per hectare of cultivated land will increase from 5.4 to 12.4 in Asia and the remainder for the rest of the world will rise from 1.4 to 1.8. Africa would remain at 2.8 persons per hectare if all usable land were cultivated. The developed countries would remain at 1.6 persons per hectare of arable land; the USA at 1.2.

While at first glance, with only one-half of the world’s usable land now cultivated and projected stable populations to increase by 1.4 times, it would appear that world soil resources can provide an adequate diet worldwide if we expand our agricultural frontier. Three considerations cast doubt on that conclusion. First, in light of social and economic forces, only a 25% increase in cultivated land is feasible. Second, degradation of soils in some parts of the world is taking place at an alarming rate because of population pressures—the developing countries possess 36% of presently cultivated land, but 72% of the world’s population (Dudal, 1982). Third, the untapped hectarage is to have the capability of feeding itself, it is necessary to produce more food where it is needed.

With this brief summary of world food production and needs, I shall examine the extent and needs for assessment of soil resources, their degradation, and needs for assessment of soil resource projections for the future.

WORLD SOIL RESOURCES

About 11% of the land area, or 1461 million ha, of the world are presently cultivated and 12%, or 1570 million ha, are potentially cultivable land in the developed countries cultivated while only 36% is presently cultivated in the developing nations. Africa and South America contain about 11 and 8%, respectively, of the cultivated land, but 26 and 27%, respectively, of potentially cultivable land in the world. About 29%, or 456 million ha, of the cultivable land than 16% of the tillable land in the world is nearly 56% of the world’s population.

Buringh (1979) summarized the major regions of the world and their potential for use as cultivated land in the Soil Map of the World (Table 2) (FAO, 1982).

Adapted from Buringh (1979). We assumed the 1050 million ha of Acrisols and Nitrosols were composed one-half of Ultisols.

### Table 1. Land use and population in major regions

<table>
<thead>
<tr>
<th>Region</th>
<th>Land area (millions of ha)</th>
<th>Arable land</th>
<th>Irrigated land</th>
<th>Cultivated land</th>
</tr>
</thead>
<tbody>
<tr>
<td>World</td>
<td>13 392</td>
<td>1 368</td>
<td>211</td>
<td>ND</td>
</tr>
<tr>
<td>Africa</td>
<td>2 886</td>
<td>163</td>
<td>8</td>
<td>7</td>
</tr>
<tr>
<td>North and Central America</td>
<td>2 136</td>
<td>265</td>
<td>28</td>
<td>N</td>
</tr>
</tbody>
</table>

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