

# Natural Capital



## PRESERVING THE RESOURCE BASE

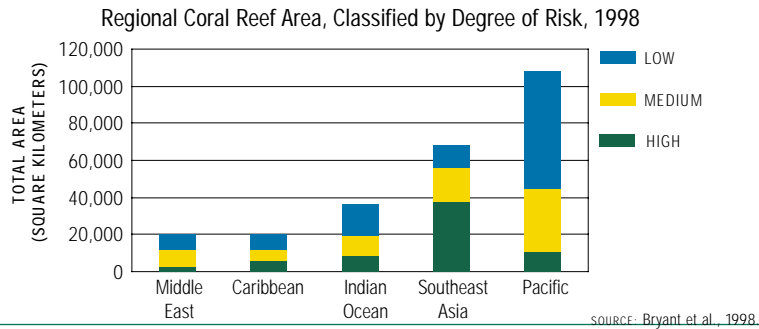
- Ecosystem
- Agriculture
- Freshwater

The world economy depends on a base of natural resources — our “natural capital” — that is showing signs of severe degradation. Without improved environmental performance, future business operations will be exposed to risks of rising prices for water, materials, and for waste disposal. Those businesses that reduce the environmental impacts of their operations, goods, and services will win competitive advantages. Protecting the long-term license-to-operate in existing and new markets depends on business strategies that preserve and renew natural habitats and critical environmental resources.



Ecosystems — communities of species that interact with each other and the physical settings in which they live — represent capital in the portfolio of natural assets that yields our livelihoods and supports our well-being. Ecosystems such as grasslands, forests, coastal areas, and rivers supply food, water, air, biodiversity, climate stability, provide places for aesthetic enjoyment and recreation, and process our wastes. They provide jobs and income: in the 1990s, agriculture, forestry, and fishing accounted for approximately four of every ten jobs worldwide, five of ten jobs in East Asian and Pacific countries, and six of ten jobs in Sub-Saharan Africa.<sup>1</sup> In a quarter of the world's nations, crops, timber, and fish still contribute more to the economy than industrial goods. Declining agricultural productivity, diminished supplies of freshwater, reduced timber yields, and declining fish harvests have taken a significant toll on many local economies.

Coral Reef Destruction Undermines Coastal Economies

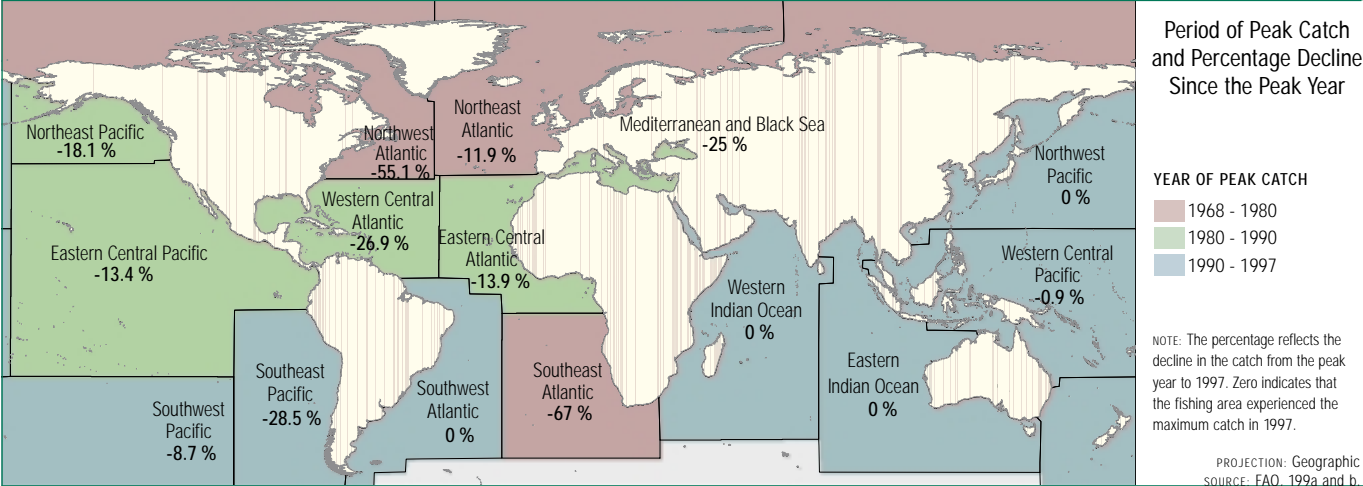


Approximately 150,000 square kilometers of coral reefs worldwide are at medium to high levels of risk of degradation; the threat is greatest in Southeast Asia and the Pacific regions. Direct human activities such as over-fishing, destructive fishing, and pollution and sedimentation from human settlement, deforestation, industry, and agriculture are the greatest immediate threats.<sup>2</sup> “Coral bleaching” is a common coral killer and may be one of the first clear impacts of climate change on biodiversity.<sup>3</sup> Degradation of coral ecosystems and the resulting loss of fish habitat and the decline in tourism jeopardize the livelihoods of some coastal communities and tourism-dependent island nations.<sup>4</sup>



The productive capacity of the planet is in decline.

Are Fleets Exploiting Marine Resources Past The Point Of Recovery?



Fisheries are a major international industry: total fisheries catch in 1997 was valued at US\$81 billion.<sup>16</sup> However, marine fisheries are showing signs of strain from over-exploitation. The last 20 years have seen great geographic expansion by industrial fleets, intensified fishing, and improved

technology but total fisheries catch has remained relatively constant since the mid-1980s.<sup>17</sup> Larger fishing fleets have had to continuously move to less-exploited fish species and less-exploited regions as they progressively harvest areas beyond their capacity to recover (see **Agriculture**).

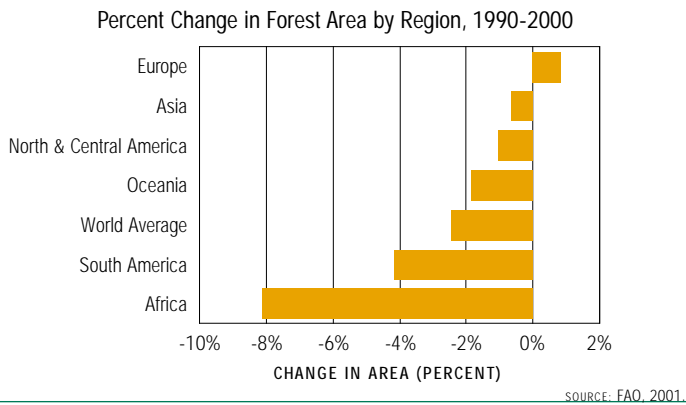
Nearly 26,000 plant species, more than 1,100 mammals and 1,200 birds, 700 freshwater fish, and hundreds of reptiles and amphibians are threatened with extinction.

RELATED TRENDS	
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Facts

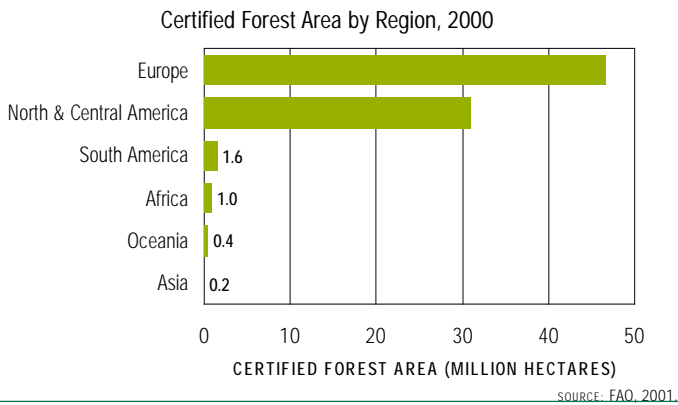
- Nearly 26,000 plant species — about 10% of all known plant species — are under threat of extinction.<sup>5</sup> More than 1,100 mammals and 1,200 birds, 700 freshwater fish, and hundreds of reptiles and amphibians are also threatened with extinction.<sup>6</sup>
- Invasive species are a worldwide problem, e.g., non-native trees in South Africa's Western Cape use more water than native species and threaten to cut Cape Town's water supply by about one third in the next century.<sup>7</sup>
- The United States has lost an estimated 53% of its wetlands.<sup>8</sup> Current repair of the natural functions of the Florida Everglades to restore habitat, water provision, and flood control is estimated to cost US\$7.8 billion.<sup>9</sup>
- In 1997, the global market for natural-product derived pharmaceuticals was estimated at US\$75-\$120 billion.<sup>10</sup>
- Human-induced evolution (acquisition of resistance) in some major pests and pathogens approaches a US\$50 billion cost to the United States economy and probably exceeds US\$100 billion.<sup>11</sup>

Forest Loss Impacts Clean Water, Biodiversity, And Climate



Between 1990 and 2000, Africa and South America — the regions of some of the world's largest surviving tropical forests — lost 8% and 4% of their total forests, respectively.<sup>12</sup> The world lost a net average of 2% of its forests during that decade.<sup>13</sup> These percentages represent huge areas: 16.1 million hectares of forest were lost per year to deforestation and conversion to plantations during the 1990s, 94% of this in the tropics.<sup>14</sup> Forests act as water reservoirs and filters, provide home and livelihoods for human populations, and play an important stabilizing role for Earth's climate (see **Freshwater**). Approximately 35–40% of Earth's carbon is stored in forests, and land use change (principally deforestation) releases roughly 20% of all annual carbon emissions.<sup>15</sup>

Ecosystem Stewardship Creates New Market Opportunities



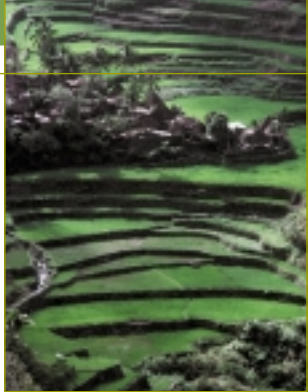
Regulatory pressures, social activism, and consumer preferences are driving producers and retailers to offer a range of products — timber, coffee, fruits and vegetables, wine and others — that are certified as produced in an environmentally and/or socially responsible manner (see **Agriculture**). About 2% of forests worldwide are certified as managed for sustainable yield and for provision of wildlife habitat, clean water, biodiversity, and other ecological services.<sup>18</sup> While the percentage of the total markets filled by certified products is now small, growth rates are very high.

Implications for Business

The private sector has an interest — and an economic opportunity — in managing the natural capital portfolio wisely. Many of the goods and services supplied by ecosystems cannot be replaced at any reasonable price. There is a growing interest in treating ecosystem goods and services not as “free” common goods, but as assets with a market value in order to provide incentive for their conservation. Economies are developing for the goods and services that ecosystems supply through creation of new property rights, markets for CO<sub>2</sub> emissions credits, markets for sustainable agriculture products, water pricing schemes, and other incentive systems. As these markets emerge, competitive advantage will go to businesses that can reduce environmental impacts, embody environmental performance in consumer products, innovate services that protect and renew the environment, and that reduce the costs and liabilities associated with ecosystem damage.



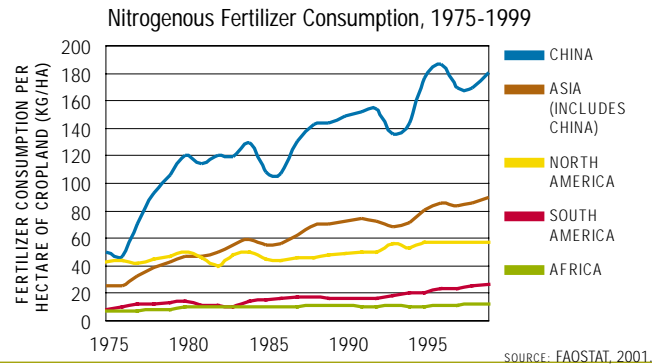
How we choose to produce food may determine the future of grasslands, forests, marine ecosystems, and other ecosystems. Keeping pace with population growth and alleviating existing malnutrition over the next decades will require greater food production with less environmental impact (see **Nutrition**). There are many warning signs that the agricultural system is under stress. Soil erosion, reductions in rates of cereal yield gains, plunging fish stocks, and contamination of waterways are widespread problems. Land clearing for agricultural production to support grain and animal protein demand has degraded or destroyed forests and grasslands. The world harvest of grains, livestock, and fish employs more water, labor, and land than any other human activity, making ecologically effective food production one of the primary goals of both economic and human development.



Facts

- About 30% of the potential area of temperate, subtropical, and tropical forests and about 40% of temperate grasslands (grasslands, savannas, and shrublands) have been converted to agriculture.<sup>1</sup>
- Cropland and managed pastures cover approximately 28% of planetary land surface, of which 31% is crops and 69% is pasture.<sup>2</sup>
- In 1997, food production was valued at about US\$1.3 trillion per year and employed about 1.3 billion people.<sup>3</sup>
- Dams built for irrigation and energy generation fragment rivers and destroy wetland and aquatic habitats. There were 5,750 large dams (>15 meters high) in 1950; today there are over 45,000.<sup>4</sup>
- World consumption of meat has more than tripled in the past four decades, outpacing population growth and exceeding 225 million metric tons per year; 37% of all grain consumption is for animal feed.<sup>5</sup>

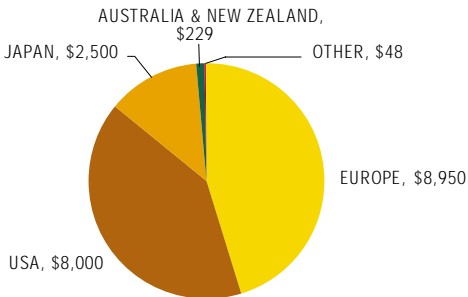
Reliance On Inputs Is Rising



Nitrogen fertilizers and irrigation are being used more and more to raise and maintain crop yields as farmers gain access to advanced production inputs (see **Freshwater**). This is particularly apparent in the fast growth and high rates of fertilizer use in China. Stagnant yields in Africa are partly due to the many African farmers who do not have access to or cannot afford effective irrigation and fertilizer. However, water drainage from high application rates of nitrogen fertilizers can lead to dead zones in rivers, lakes, and coasts.

Concerned Consumers Create Hot Markets

Organic Retail Sales, Forecast for 2000 (\$US Millions)



Certification standards are spreading worldwide for “organic” food — food produced without chemical inputs and to various standards of ecosystem stewardship. Today’s worldwide retail market of US\$20 billion for organic-certified products is growing approximately 10% to 30% annually in the industrial nations.<sup>8</sup> More than 130 countries produce certified organic food in commercial quantities including at least 65 developing countries.<sup>9</sup>

Food production is the basis of many economies but threatens the ecosystems upon which it depends.

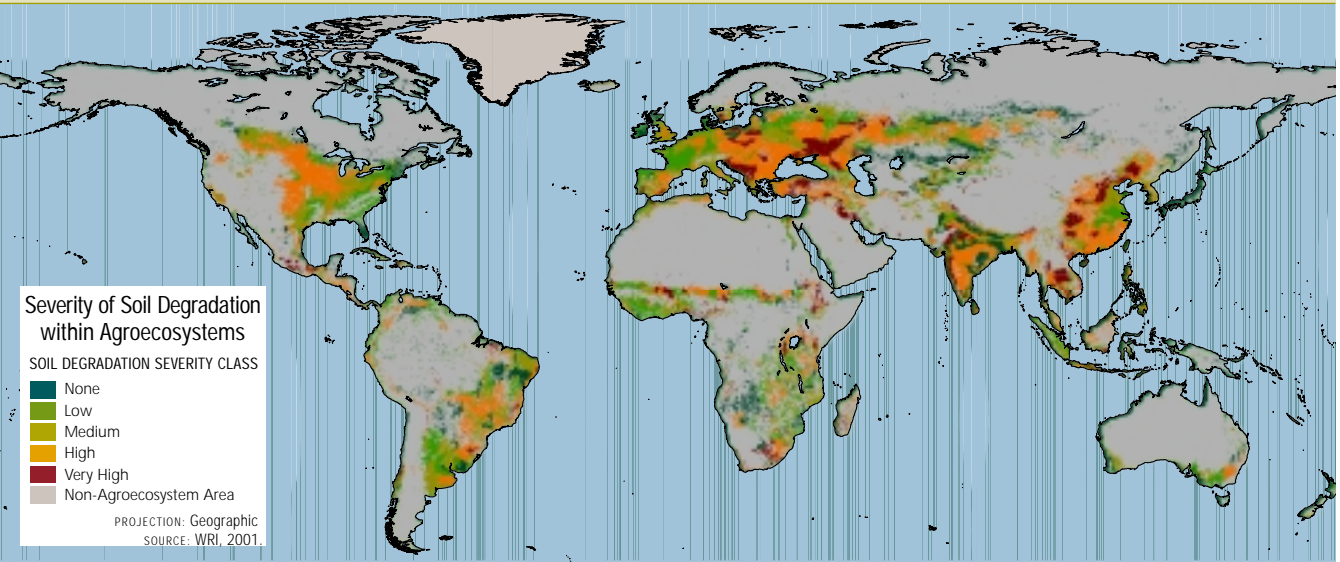


About 30% of the potential area of temperate, subtropical, and tropical forests and about 40% of temperate grasslands have been converted to agriculture.

RELATED TRENDS

Nutrition	14
Health	16
Consumption	22

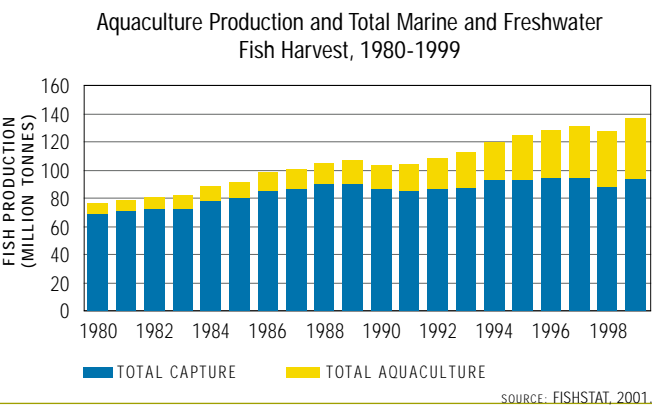
Sustainable Agriculture Depends On Soil Quality



Agriculture is a primary source of employment and income for many developing countries and generates over one third of GDP in many low-income countries.<sup>6</sup> Agricultural crops can be very valuable, particularly in densely settled areas in China, Southeast Asia, and Europe, but also in parts of Africa and South America where export crops are grown. Half or more of the labor force in East, South and Southeast Asia, and Sub-Saharan Africa is directly involved in agriculture (see **Labor**).

Healthy soils are vital to high levels of agricultural value but large areas of productive land have been degraded by human mismanagement and climatic effects. Degradation of agricultural land (such as erosion, salinization, water-logging, nutrient depletion, acidification, and pollution) endangers food production and livelihoods. Worldwide, more than 40% of agricultural land is moderately degraded, 9% is strongly degraded and degradation has reduced worldwide crop productivity by approximately 13%.<sup>7</sup>

Farmed Fish Becomes Big Business



Rising demand and declining productivity of marine and freshwater ecosystems have driven the modernization and fast growth of aquaculture (see **Ecosystems**). Farmed fish and shellfish production has grown in volume more than tenfold since 1970, rising from 3.5 million to 42.8 million metric tons and in value from US\$12 billion in 1984 to US\$53.5 billion in 1999.<sup>10</sup> Aquaculture solves some problems of over-fishing but can create high environmental costs in coastal land use, water pollution, and use of ocean-caught fish in fish feeds.

Implications for Business

The success of the past half century at meeting world food needs has been matched by the continued degradation of the productive capacity of natural systems. The concept of sustainability has been described as living off of the interest of natural capital without harming the principal. The greatest threats to ecosystems are the conversion of land and water habitats for agricultural uses or their destruction by over-harvesting; how we produce human food, animal feed, and fiber will largely determine the preservation of biodiversity and ecosystems. The private sector plays an important role by supporting agricultural research, transferring knowledge, products, and agricultural practices with which farmers can conserve and protect resources such as water, soil, and plant and animal species. New approaches — from organic farming, to fish-farming, to genetic engineering — are transforming how we produce and conceive of food and also impact our capacity to protect and restore vital natural resources.

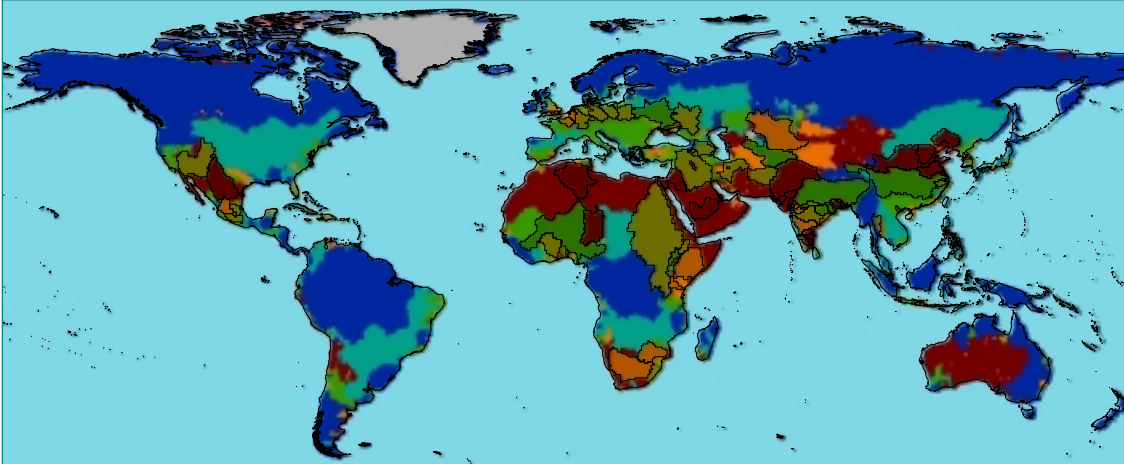


Water availability is arguably the world's most pressing resource issue. Water is essential for all living things, has shaped human societies for millennia, and is the basis of business activities such as cooling, food processing, chemical synthesis, and irrigation. Growing water scarcity and alarming declines in aquatic biodiversity are evidence that water policies and practices in most parts of the world are failing to protect life's most vital resource. Population growth, industrialization, urbanization, agricultural intensification, and water-intensive lifestyles are placing great stress on freshwater systems, with both water use and pollution driving the scarcity of useable water. Surfacewater quality has improved in most developed countries during the past 20 years, though nitrate and pesticide contamination remain persistent problems. Data on water quality in other regions of the world are sparse, but water quality appears to be compromised in almost all regions and continues to decline in areas with intense agricultural development and rapid urbanization.

Facts

- Over the past century, world water withdrawals increased almost twice as fast as population growth.<sup>1</sup>
- More than 20% of the world's 10,000 recorded freshwater fish species have become extinct, threatened, or endangered in recent decades.<sup>2</sup> Factors contributing to freshwater fish extinction include habitat alterations (71%), non-native species (54%), overfishing (29%) and pollution (26%).<sup>3</sup>
- In 60% of the European cities with more than 100,000 people, groundwater is being used at a faster rate than it can be replenished.<sup>4</sup> Cities that have experienced aquifer drops between 10 to 50 meters include Mexico City, Bangkok, Manila, Beijing, Madras and Shanghai.<sup>5</sup>
- Water pricing is a clear trend in developed countries; 17 of 18 OECD countries surveyed showed annual increases in household water prices in the 1990s.<sup>6</sup>

40% Of The World Will Live In Water-Scarce Regions By 2025



Projected Renewable Water Supply per Person by River Basin, 2025

ANNUAL RENEWABLE WATER SUPPLY (M<sup>3</sup>/PERSON/YEAR)  
<500  
500 - 1,000  
1,000 - 1,700  
1,700 - 4,000  
4,000 - 10,000  
>10,000  
No data  
NOTE: Outlined basins are projected to have a population of more than 10 million people in 2025 and to be in or approaching water scarcity.

PROJECTION: Geographic SOURCE: CIESIN, 2000; Fekete et al., 1999.

Large areas of the world experience "water stress," defined as below 1,700 cubic meters per year per person.<sup>10</sup> In areas where supplies drop below 1,000 cubic meters per person, shortages disrupt both food production and economic development unless the region is wealthy enough to apply new technologies for water conservation and re-use. An estimated

2.3 billion people, 41% of the world's population, currently live in water-stressed areas. By 2025, 3.5 billion are projected to live in water-stressed areas.<sup>11</sup> Water scarcity has also led to conflict between upstream and downstream areas within countries, and tense relations between countries sharing a transnational waterway or watershed.<sup>12</sup>



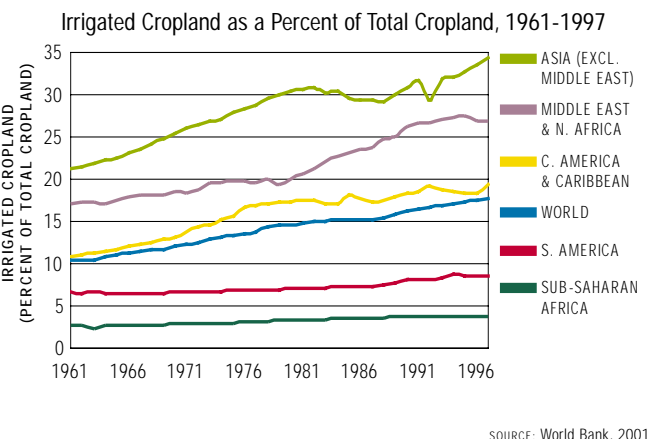
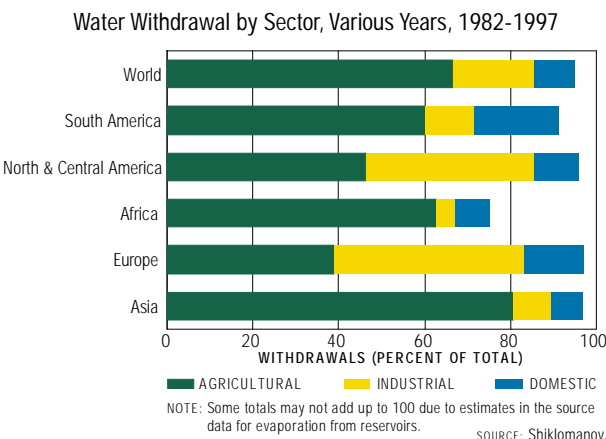
Freshwater is growing scarce amidst competing human needs.

Over the past century, world water withdrawals increased almost twice as fast as population growth.

RELATED TRENDS

Health	16
Efficiency	28
Privatization	54

Thirsty Crops Dominate World Water Withdrawal

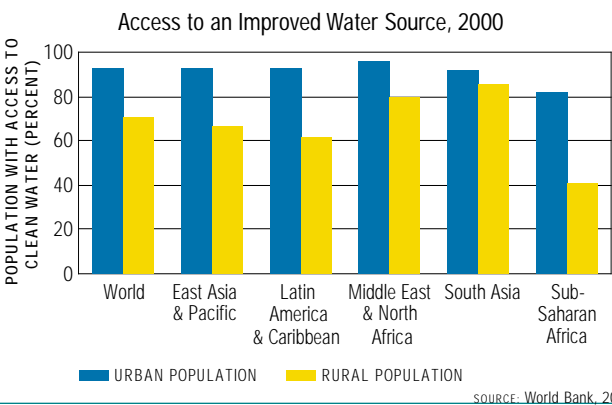


Seventy percent of all freshwater withdrawal is for agriculture.<sup>7</sup> Inefficiency abounds in water usage and exacerbates scarcity problems; over half of the water withdrawn for irrigation never reaches the target crop because of leakage and evaporation.<sup>8</sup> Overuse of agricultural inputs

such as chemical fertilizers, pesticides, and manure contaminates water supplies with nutrients like nitrates, phosphorus, and heavy metals that can cause significant problems for water quality (see **Agriculture**).<sup>9</sup>



Access To Safe Water Improves But Still Eludes Many



Over one billion people worldwide, most in rural areas, lack access to a safe water source and more than 2.5 billion people do not have access to adequate sanitation facilities.<sup>13</sup> Unclean water and poor hygiene take an enormous toll on the health of populations through preventable disease; there are approximately 1.5 billion cases annually of diarrhea in children under the age of 5, resulting in 3.3 million deaths (see **Health**).<sup>14</sup> Trachoma, a water-borne bacteria, caused blindness in 6 million people, and water-borne parasites led to 700 million cases of hookworm and 1.3 billion cases of roundworm.<sup>15</sup>

Implications for Business

The pressures on freshwater supplies portend rising water costs and an urgent need to improve water-use efficiency. Short water supplies will make it difficult for water-intensive businesses to site their activities in arid regions and will increase water-related costs everywhere. Raising prices for water usage can send signals to consumers that conservation is good for the environment as well as to investors to attract funding for essential water infrastructure. True cost recovery for water is made difficult by subsidies that include public investment in irrigation projects, irrigation water pricing, urban and industrial infrastructure, and uncompensated environmental damage from water over-use and pollution. Increases in industrial water efficiency as well as private sector involvement in water management hold promise; reduction of water use, closed-loop systems, and elimination of water discharges can lower water costs, energy costs for pumping and cooling, and wastewater treatment costs. Water scarcity may create a new arena for business differentiation — those with water-efficient processes or products may have greater operational flexibility and more competitive cost structures in a water-stressed world.