MAPPING CONSUPTIOIN OF PLANT PRODUCTION

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Recent satellite images are helping measure the impact humans have on global plant production. This will identify impacts on ecosystems, particularly the Earth's carbon cycle, which affects global warming.

NASA has been using satellite data to measure Net Primary Production (NPP), the yield of organic mass stored by plants. NPP is a parameter used to quantify the net carbon absorption rate by living plants. NPP is the difference between plant photosynthesis and respiration which releases part of the carbon absorbed, that is, NPP = Photosynthesis Rate – Plant Respiration Rate (expressed in units of gram carbon/square metre/year This indicates the rate of carbon fixation by photosynthesis, an essential function of life on earth. By gathering measurements of a variety of plant properties, scientists can map how NPP changes every eight days. Additional data from the World Wildlife Fund and other groups has measured how much of this quantity is being consumed by humans in the form of food, fibre, wood and fuel. NASA models also took into account the amount of plant-life required to support domestic animals.

Benefits of using satellite data:

- Rapid coverage of large areas
- Detection of inter-seasonal and inter-annual variations
- Consistent data quality
- No damage to plants
- Cost effectiveness

NPP varies by ecosystem. Coral reefs, algal beds and wetlands are the most productive (2,500 grams per square metre per year), followed closely by rainforests (2,200). The highest productivity occurs during midsummer in temperate climates, however tropical regions are more productive over a year because they have a longer growing season. Temperate forests are about half as productive annually as rainforests. Cultivated land is even lower (650).

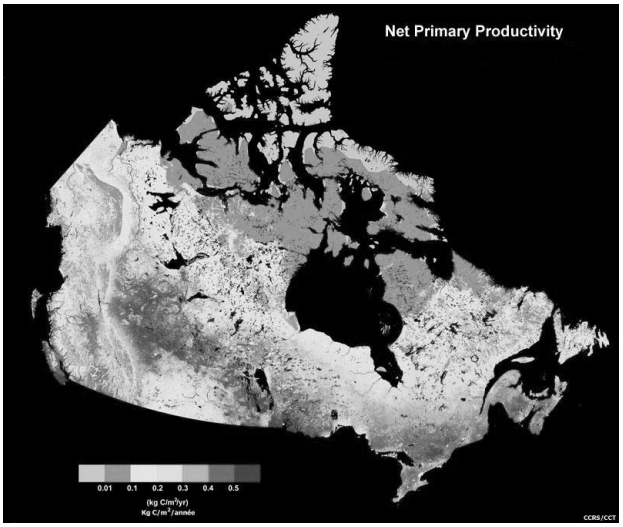
Humans annually consume 20 per cent of NPP generated on land (the models did not take into account ocean production). Consumption varies by region. Humans in sparsely populated regions place little demand on local production, however urban areas may consume 300 times what is produced locally. East and South Central Asia contains about half the world's population and consumes 72 per cent of the region's NPP.

However per capita consumption also varies drastically by region. The same part of Asia consumes far less than the global average per person. If everyone consumed at the same rate as North Americans, global consumption of NPP would be about 35 per cent.

Table 1. Average annual Net Primary Productivity of the Earth's major biomes

Ecosystem Type	**Net Primary Productivity**(kilocalories/meter $^{-2}$ /year)
Tropical Rain Forest	9000
Estuary	9000
Swamps and Marshes	9000
Savanna	3000
Deciduous Temperate Forest	6000
Boreal Forest	3500
Temperate Grassland	2000
Polar Tundra	600
Desert	<200

Net Primary Productivity, Canada.



Understanding human impact on NPP is essential because it relates to plants' consumption of carbon dioxide, a gas that contributes to global warming. High plant productivity helps moderate climate change. Regions showing a high consumption of NPP may have a direct effect on the earth's metabolism and ability to absorb CO2. Other regions, like North America, have a more indirect effect. While their consumption of local NPP is close to the global average, they are high importers of products from other regions.