



**Key to Flows:**

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| <p><b>1)</b> Fossil Fuel Burning — 5 GtC/yr<br/> <b>2)</b> Volcanic Emissions — 0.6 GtC/yr<br/> <b>3)</b> Uptake of CO<sub>2</sub> by cold surface waters of the oceans — 90 GtC/yr<br/> <b>4)</b> Photosynthesis of marine biota in cold surface waters — 8 GtC/yr<br/> <b>5)</b> Respiration of living marine biota and rapid recycling of dead biota in cold surface waters — 14 GtC/yr<br/> <b>6)</b> Sinking of dead marine biota (both organic and inorganic carbon) from cold water into deep water — 4 GtC/yr<br/> <b>7)</b> Downwelling of cold surface water (mainly near the poles) — 96.2 GtC/yr<br/> <b>8)</b> Advection (horizontal transfer) from warm to cold surface water — 10 GtC/yr<br/> <b>9)</b> Sedimentation on sea floor (both organic and inorganic carbon) stores carbon in sedimentary rocks — 0.6 GtC/yr<br/> <b>10)</b> Release of CO<sub>2</sub> by warm surface waters of the oceans — 90 GtC/yr</p> | <p><b>11)</b> Photosynthesis of marine biota in warm surface waters — 32 GtC/yr<br/> <b>12)</b> Respiration of living marine biota and rapid recycling of dead biota in warm surface waters — 26 GtC/yr<br/> <b>13)</b> Sinking of dead marine biota (both organic and inorganic carbon) from warm water into deep water — 6 GtC/yr<br/> <b>14)</b> Upwelling of deep water (at equator and along edges of continents) — 105.6 GtC/yr<br/> <b>15)</b> River runoff transfers carbon from the land to the sea — 0.6 GtC/yr (2/3 to warm ocean, 1/3 cold)<br/> <b>16)</b> Deforestation and land clearing releases CO<sub>2</sub> into the atmosphere — 1.5 GtC/yr<br/> <b>17)</b> Photosynthesis of land biota — 110 GtC/yr<br/> <b>18)</b> Respiration of land biota — 50 GtC/yr<br/> <b>19)</b> Litter fall and below-ground loss from plant roots transfers carbon to the soil — 60 GtC/yr<br/> <b>20)</b> Respiration of microorganisms in the soil releases CO<sub>2</sub> into the atmosphere — 59.4 GtC/yr</p> |
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Figure 7.00. The global carbon cycle, as best estimated, in 1994. Data slightly modified from Siegenthaler and Sarmiento, 1995; Kwon and Schnoor, 1995.

**Regard position 1. of flows: These 5 GtC/yr are in accordance in IPCC-graph Global Sources**

The global carbon cycle is currently the topic of great interest because of its importance in the global climate system and also because human activities are altering the carbon cycle to a significant degree. The potential effects of human activities on the carbon cycle, and the implications for climate change were first noticed and studied by the Swedish chemist, S. Arrhenius, in 1896. He realized that CO<sub>2</sub> in the atmosphere was an important greenhouse gas and that it was a by-product of burning fossil fuels (coal, gas, oil). He even calculated that a doubling of CO<sub>2</sub> in the atmosphere would lead to a temperature rise of 4-5°C -- amazingly close to the current estimates obtained with global, 3-D climate models that run on supercomputers. This early recognition of human perturbations to the carbon cycle and the climatic implications did not raise many eyebrows at the time, but the experiment was just beginning then.

Source: [http://www.geosc.psu.edu/~dmb53/DaveSTELLA/Carbon/carbon\\_intro.htm](http://www.geosc.psu.edu/~dmb53/DaveSTELLA/Carbon/carbon_intro.htm)

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