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by Philipp Juelke and Henriette Lachenit for the nomination of Mr. Hasenkamp to the “Forest Heroes Programme and Awards” of the UN

The basics of math's and the ABC about forest and trees

The basic of math's

The air of the planet consists to 78% of nitrogen (N), 21% of oxygen and 0.9% of Argon. Approximately 0.4 per mill (exact figure 0.385 per mill) are occupied with carbon dioxide (CO₂) and other greenhouse gases as well as noble gases. The air weighs 1.3 kg per cubic meter. The density of CO₂ is about 2 kg/m³. The world's total air mass weighs 5,130 trillion tons as much as a mountain range of 3 km in height, 60 km in length and 15km in width. The earth's total mass exceeds this by the factor 1 million. The air temperature at zero altitude (ca. 15°C in world average) is regulated by CO₂ together with water vapor and other greenhouse gases.

The risks resulting from an increasing concentration of CO₂ have been already recognized. With a share of 385 ppm (parts per million) an amount of 3,050 billion tons of CO₂ are in the atmosphere. Since the beginning of the industrialization about 1,800 billion t CO₂ have been emitted to the atmosphere; approximately 1,000 billion t have been sequestered by oceans, forests and other nature systems. That is why the CO₂-concentration has been increased by 800 billion t (from 280 to 385 ppm) in this period.

The annual amount of anthropogenic greenhouse gases is at the moment around 45 billion t CO₂-equivalent. This CO₂-gas cloud has - when considered to be ball-shaped - a diameter of 28 km and is additionally generated year by year. Right now the CO₂-concentration is growing at an annual rate of 2 ppm.

The CO₂-molecules which have been added to the atmosphere in the last 200 years are causing a warming effect (with about 1.7 Watt per m²) equaling 15 kWh/m² per year. When this effect is calculated for the entire earth surface it becomes evident that the CO₂-greenhouse effect is already producing an additional warming which is 100 times higher than the direct warming caused by the burning of fossil fuels and the use of nuclear power respectively.

The photosynthesis is responsible for the sequestration of carbon (C) from the air into biomass which mainly consists of the elements hydrogen, oxygen and carbon. Every biomass - this includes trees/forest - consists to around 50% (of its weight) of carbon. Consequently more photosynthesis on existing and new forest areas can create a counterweight to the CO₂-enrichment in the atmosphere caused by mankind. When CO₂-emissions cannot be avoided the rule is: relocation of harmful carbon-stocks in the atmosphere in additional useful carbon-stocks in forests!

This so-called "forest-option" of the climate change policy is even more important since it can be observed that the real emission-course of the world society is increasing - and this despite of all the globally distributed resolutions and international agreements. It is also alarming that the carbon-intensity (CO₂-amount per unit of the world gross national product) is not decreasing since the year 2000 - in contrast to the trend between 1900 and 2000. At the moment the added value of each dollar on the globe is connected to around 0.85 kg of CO₂-emission.

Even when including the CO₂-effect of the scandalous deforestation in several countries the nature-systems of the continents (especially forests including afforestation) are absorbing around 3.5 billion t CO₂ net. (After all this is almost five times as much what the 82 million inhabitants of Germany are emitting every year by their economical and private activities - including also state activities). Without oceans, forests, peatlands and other terrestrial carbon sinks - which have absorbed more than half of the CO₂-emissions in the last 150 years - the CO₂-concentration in the air would be around the risky level of 510 ppm. As already mentioned the real current value is around 385 ppm.

Even if the sink efficiency - considered relatively - of the oceans and forests is slightly decreasing year by year, it has increased when calculated in absolute figures in the past decades. There are indications that the oceans are absorbing less by trend (8 billion t CO₂ per year). On the other side the land vegetation (forests, grasslands and others) has not decreased - considering deviations from year to year - in efficiency (9 billion t CO₂ per year).

The forest surface worldwide is around 4 billion hectares (or 40 million km²). This is equal to the area of Canada and China and USA and Argentina combined. For each world inhabitant there are 6,000 m² of forest with 600 trees statistically.

The net-reduction of the forest area was around 90,000 km² per year between 1990 and 2000; between 2000 and 2005 it was just around 70,000 km² per year (considering afforestation, plantations and natural extension of some forests).

In the living biomass of forests are sequestrated around 360 billion t of C (or 1,320 billion t of CO₂); considering the C-sequestration in soil and dead biomass the value increases to 1,150 billion t C (or 4,200 billion t CO₂). The carbon stock of the world's forest is therefore 40% larger than the carbon stock of the atmosphere.

Afforestation and natural forest succession are already occurring without a special climate change mitigation motivation (especially in China, Spain, Vietnam, USA, Italy, Chile, Cuba, Bulgaria, France and Portugal). This contributes with an increment of more than 50,000 km² per year.

The trend of the annual increment of the afforestation areas (2000-2005) points to an annual sequestration rate of younger or current afforestation of 3 billion t CO₂ in the year 2020. Thus the sink-capacity of the continents will therefore be at least stabilized if not even increased by about 2 billion t CO₂-units.

Forests are the home of around 300 million people. About 1,600 million people are strongly dependent on the forest in terms of firewood, food and medicine. Thereof 60 million people have adapted their whole livelihood on the forest as their home (indigenous people); more than 1 billion people are applying agroforestry.

The world forest sector is providing jobs for around 13 million people. The global timber production is 3.5 billion m³. That is - figuratively spoken - an annual wooden cube of 1km length, 1km width and 3.5 km height. Useful products are: firewood (i.e.

around 10% of the world energy need), round timber, saw log, (paper, cardboard, panel). About 2 billion people are using firewood for cooking and heating.

The products of the forest and fruits of the trees are delivering proteins, fats, vitamins and minerals. Meat of animals from the forest - including reptiles, birds and insects - are an important food source for several million people. More than three quarters of the population in developing countries are depending on the forest as the only source of medical treatment.

Forests secure the biological diversity, and protect the soil and the water household; they are controlling the climatic conditions in the small scale up to the global context. Forests prevent avalanches, landslides and desertification. Trees protect coasts.

Single tree species are living and growing for centuries. For example a Huon pine in the southwest of the island Tasmania is estimated to be 10,500 years and a redwood tree at the west-coast of North America to be 7,000 years old. In North America a 1,000 year old Sequoia is almost 130 m high. Approximately 30,000 tree- or wooden shrub species are existent on the continents.

Forests host around two thirds of all species on the globe. Around 90% of all species on the continents are to be found in the forest. Solely the destruction of tropical forests is responsible for the extinction of around 100 species (plants, animals) per diem.

The United Nations Environment Program (UNEP) appeals to the world public to plant trees since last year already. The evidence of the current number of the promised and actually yet planted trees can be found online permanently (www.unep.org).

Around 2 billion seedlings were planted already; the target has been increased from 1 billion to 3.5 billion. Supposing 1,000 trees per hectare this leads to a new forest of the size of the German federal state of North-Rhine-Westphalia (34,000 km²).

Human civilization, which developed during the past 10,000 years, has - except for regional exceptions during the last past centuries - permanently destroyed forests, altogether an area of 15 to 20 million km².

That is around 30 % of the total forest area, which existed in former times. Since millenniums humankind is eliminating the forests in order to gain area for settlement or agriculture. At the same time people are using wood as fuel and building material and for many everyday objects, without making sure, that - following the principle of sustainability - an equal amount of wood is growing back as it has been exploited.

Only one third of all remaining forests of the world can be considered to be primary forests, which have not experienced serious harms through encroachments and utilization made by man. To compensate the gross loss of forests only for the years 1990 to 2000, it would be necessary to replant an area of the size of Egypt. This would be possible by planting 140 billion trees, which means from a statistical point of view, that every human on earth is planting two trees per year - and this for a period of 10 years.

The ABC

Mankind stands, when talking about myths, religion, art and language, "in the forests". The bible is talking about the Tree of the Knowledge of Good and Evil. Zeus is the god of oaks in ancient Greece, Diana the goddess of forests. The eldest oracle has been the oak of Dodona in Greece. Jupiter was the god of oaks. The Seven Hills of

Rome were in former times covered with oak-forests. The mother of Romulus and Remus was called Rhea Silva (Latin: silva = forest). Ovid wrote about the twosome Philemon and Baucis, who turn into an oak and a lime-tree.

Key-player of the North-European-Myths is the world-tree Ygdrasil; after that the first human beings were called Askr and Emble (=Ash and Elm). Buddha meditated under the fig-tree. He was born in the forest and he died in the forest.

Moreover there are many words, names and toponyms, which reference to tree or forest respectively.

Some samplings: family tree, seminar (as educational class), derived from tree nursery, Lat.: semen/seminis = the seed), local branch, alley, Hollywood, oboe (French: hautbois; bois= forest/wood; haut=high or. high-sounding), Woodstock, Clint Eastwood, Prenames Sylvia and Bridged (derived from birch), Opera Tannhäuser (German: Tanne = fir), Don Bosco (Italian: bosco = Wald), Town Leipzig (derived from the Slavic Lipice = lime), Island of Madeira (Portuguese/Spanish: land, which is rich in forests), xylophone (Greek: xylos = wood), Pennsylvania, Holland (holtland = well-forested land), Federal German State Holstein (holtsate: inhabitants of the forest), German towns Bocholt, Bochum, Buxdehude (3x pointer to beeches), Town Dresden (settlers at the floodplain forest), Elmshorn, German mountain chains Harz (wooded mountain range), or Spessart (forest of woodpeckers), novel "The Man who Planted Trees" (J. Giono), novel "The Baron in the Trees" (I. Calvino) etc. aso..

At www.google.de there are around 33 million entries for the German keywords for woodland, forest, tree, rainforest, oak, beech. At www.google.com even 800 million entries show up. There are only a few other items, which top this result in quantity.

Sources:

FAO Forestry-Website (forests/ trees)
Global Carbon Project-Website (climate/CO₂-balance)
PrimaKlima-weltweit e.V. (air/CO₂/language/myths)
UNEP-Website