

Scientific and Spiritual Dimensions of Climate Change

Unit 5

Required Actions by Society

Section 1: The Broader Social and Environmental Context of Climate Change Mitigation

Humanity is in great need of sustainable development in many areas. In addition to climate change, numerous other environmental problems have silently been growing: The unprecedented rapid decline in biodiversity¹, the catastrophic chemical pollution of our water, air, and soil - there are more than 70,000 chemicals currently in common use², and the overexploitation and depletion of natural resources (for example fisheries).

At the same time, we must address the outrageous disparity of wealth and poverty and figure out how to feed ever larger numbers of people on a finite planet. Today, there are almost one billion people who don't have enough food! And many people lack access to clean water. Any progress in tackling all these very serious issues requires a holistic approach and a radical re-conception of the economy. A radical transformation means "coming from the root", not violent. Meaningful climate action can and must be integrated in addressing all these issues.

The United Nations addresses these global challenges with the 17 Sustainable Development Goals to be achieved by 2030.³ Mitigating climate change is one of them. The good news is that all these issues are strongly interconnected, and that practical measures for one often support other goals as well. The proposed areas of action below are specifically climate actions, but they often have direct positive effects in other areas.

What Needs to Be Done?

What do we need to do to limit the warming and to secure a future for our children? The answer is simple and clear: "We have to do everything, and we have to do it immediately."⁴

Section 2: Mitigation and Adaptation

Humanity needs to take action on climate change in two ways:

- *Mitigation* reduces greenhouse gases in the atmosphere.
- *Adaptation* reduces vulnerability to climate change.

Mitigation

Greenhouse gases come from power plants, deforestation, transport, agriculture, industry, buildings, and waste. Emissions must be significantly trimmed everywhere. This will require a re-thinking and re-organizing of almost everything we are doing as a society and as individuals.

Adaptation

Because climate change is already under way, we need to adapt. Farmers in many areas may need to change to crops that are more resistant to drought and higher temperatures. In low-lying areas, zoning plans may need to consider sea-level rise. Human settlements may have to be moved and certain areas evacuated. Many poor countries will need technical and financial support from rich countries.

The remaining sections of this unit are all part of *mitigation* efforts, because adaptation needs are very specific and vary depending on the location. Moreover, there are limits to adaptation. If we continue with business as usual (if we don't reduce our greenhouse gas emissions), many of the effects of climate change will exceed our ability to adapt.

Section 3: Energy Generation and Use

At almost 26% of the total, energy production is responsible for the largest share of greenhouse gas emissions.⁵ We must reduce the amount of energy we are using and at the same time quickly transition away from the use of fossil fuels to clean energy.

The quickest and most cost-effective reduction measures are *energy conservation and efficiency*. Conservation means that we use less energy, and efficiency means that appliances, vehicles, and machines of all kinds are more energy-efficient, so that they emit less greenhouse gases. If these two measures are implemented to the full extent possible, they could reduce energy use significantly.

In the industrial sector, there is a huge potential for reducing energy use, for example by using the most efficient production technologies, by recycling more plastics, and by retrofitting of buildings with better insulation.⁶

However, there is no way that we can live without energy. Fortunately, the clean energy technology has been developing quickly so that it is realistic now to transition away from fossil fuels to clean energy.

Coal is the worst CO₂ polluter. Phasing out *coal-fired power plants* (and not building new ones) should get first priority in mitigating global warming, according to NASA scientist James Hansen. There are many other environmental and health benefits from abandoning them because these power plants emit huge amounts of toxic chemicals, especially mercury.

Clean energy, sometimes also called *renewable energy* “taps into natural cycles and systems, turning the ever-present energy around us into usable forms,” for example the movement of wind and water, the heat and light of the sun, heat in the ground, the carbohydrates in plants. ... Because they are homegrown, renewables can also increase our energy security and create local jobs.”⁷

It is necessary to use the already available technology to build wind turbines and solar energy systems on a large scale as quickly as possible. At the same time, much more research needs to be done in renewable energy.

In recent years, clean energy, especially solar and wind has advanced with astonishing speed. The technology has become better and less expensive and is being widely implemented.

Even the Baha'i House of Worship in India produces about one quarter of its energy use with solar power. It was the first major public site in Delhi to have installed a "net metre", which means that it is connected to the city grid.⁸

The will to use renewable energy has gained strength both for environmental as well as for economic reasons. Progress is being reported from all corners of the world:

Replacing fossil fuels with renewable energy doesn't have one easy solution. Because no other non-nuclear energy source is as powerful as fossil fuels, a range of different energy sources needs to be used. The choice of energy sources will depend on their local availability.

A new renewable energy infrastructure needs to be built in order to satisfy long-term energy needs in a climate friendly way.

Many scientists, for example James Hansen, explain that renewable energy alone will not be sufficient to meet humanity's energy needs, even if we lower them substantially. We will also need nuclear energy. However, we must abandon the old nuclear technology that poses a threat of dangerous accidents and produces radioactive waste that stays highly toxic for tens to hundreds of thousands of years. New technologies are being developed for nuclear power plants that are much safer, and their waste decays much faster – within decades. There is already some existing technology for a nuclear power plant that could use the accumulated nuclear waste for fuel, but the technology will need to be further developed and implemented. However, the use of nuclear power also requires that humanity grows in spiritual maturity, so that the technology is not used for nuclear weapons. The decision of building nuclear power plants will need to be based on scientific knowledge and spiritual/ethical principles.

Section 4: Transportation:

"Society currently relies almost exclusively on petroleum-based fuels, such as gasoline, for transport. This fuel use is responsible for 13% of worldwide greenhouse gas emissions."⁹

In addition, in many of the world's cities like Beijing or Mexico City the quality of daily life is deteriorating because of heavy air pollution. Breathing the air in some cities is equivalent to smoking two packs of cigarettes per day. In the United States, the number of hours commuters spend sitting in traffic going nowhere climbs higher each year.

It is time to put the interest of people before cars. A good public transportation system is very important for curbing greenhouse gas emissions. Good city planning and avoiding urban sprawl are prerequisites for efficient public transport.

Many cities have improved their public transportation or set up bike-rental systems to encourage the use of bicycles instead of cars.

High speed bullet trains also reduce greenhouse gas emissions by reducing air and automobile travel.

Fuel efficiency standards for cars should be raised as high as possible with current technology. The price of energy should reflect its true cost to society which is estimated to be about \$15 a gallon (2.4 British pounds) per liter. Once such hidden costs are incorporated in the pricing system, the higher prices for more polluting cars will hopefully help to reduce the numbers of cars on the world's street.

The use of electric cars could be encouraged with financial incentives. However, electric cars will only help mitigate climate change if the electricity comes from clean energy sources. In addition, electric cars cannot be the "solution" to the climate crisis because their manufacturing requires enormous amounts of energy and natural resources, and the batteries require rare minerals such as lithium and cobalt, and their mining is linked to horrendous human rights violations and environmental destruction.

Carpooling and sharing are necessary, as well as people adopting less car dependent lifestyles and avoiding unnecessary travel.

Section 5: Sustainable Agriculture

*"The land shall not be sold in perpetuity, for the land is mine; with me you are but aliens and tenants."*¹⁰

The Bible

*"Whoever brings dead land to life, that is, cultivates wasteland, for him is a reward therein."*¹¹

Muhammad

Our civilization began about 10,000 years ago, at a time when the Earth's climate became more stable. Agriculture requires such a climate with only minor variations. As we have seen in Unit 3, most climate changes are detrimental to agriculture and threaten global food supply.

While agriculture will be one of the first casualties of climate change, it is also a major contributor of greenhouse gases. 31% of total greenhouse gas emissions come from human land use.¹²

Current agricultural practices and the whole food economy are greatly contributing to global warming. One way of practicing stewardship is with sustainable agriculture. "Growing plants can remove huge amounts of carbon from the atmosphere and store it in vegetation and soils in ways that not only stabilize the climate but also benefit food and fiber production and the environment."¹³

Organic agriculture can significantly reduce carbon dioxide emissions. Synthetic fertilizers release greenhouse gases into the air. But the organic approach sequesters carbon: It takes carbon out of the air and puts it back into the soil. The use of compost increases organic matter and therefore leads to more fertile soils and better water retention capacity, which will make plants more flood and drought resistant.¹⁴

Organically grown crops can better withstand the higher temperatures caused by global warming. Many experts believe that organic agriculture is not only a tool to reduce emissions of greenhouse gases, but also a way to alleviate poverty and improve food security in developing countries.

Discontinuing the widespread heavy use of pesticides and herbicides is also of paramount importance to protect biodiversity. Agricultural (and lawn) chemicals are likely the main cause for the vanishing of bees, bumblebees, butterflies, and other insects.

Livestock are responsible for 18% of greenhouse gas emissions, a bigger share than that of transport. A major reason for the high carbon dioxide emissions by livestock is “deforestation for the expansion of pastures and arable land for feed crops. Livestock generates even bigger shares of emissions of other gases with greater potential to warm the atmosphere: as much as 37% of anthropogenic methane, mostly from digestive processes of cows, and 65% of anthropogenic nitrous oxide, mostly from manure.”¹⁵

Besides climate change, other serious problems are associated with meat production, because farms and food processing plants have grown into gigantic factories. This development has not been in the interest of people: Farm hands and employees often work under slave like conditions; the quality of the food is greatly diminished; salmonella poisonings have become more frequent; chemical fertilizers, pesticides and herbicides are polluting soil and water and affect human health, contributing, for example, to rising cancer rates. Human health is also compromised by the regularly administering of antibiotics and growth hormones to livestock. If thousands, often tens of thousands of animals are living in the extremely close proximity of a factory farm, the danger of disease is high. That’s why new diseases like avian or swine flu are spreading. Moreover, the vast amount of animal waste not only releases substantial amounts of greenhouse gases, especially methane, but is also very toxic. “The livestock sector also contributes to water depletion; currently, the livestock sector accounts for 8 percent of human water use globally.”¹⁶ A study found that “beef cattle raised organically on grass emit 40% less greenhouse gas and use 85% less energy than cattle raised on grain.”¹⁷

The benefits of a vegetarian diet were expressed by the voices of religion and of science way before the climate crisis came to our attention.

*“The food of the future will be fruit and grains. The time will come when meat is no longer eaten.”*¹⁸

‘Abdu’I-Baha

*“Nothing will benefit human health and increase chances for survival of life on earth as much as the evolution to a vegetarian diet.”*¹⁹

Albert Einstein

It is still possible to raise some livestock in a sustainable way. However, meat can only play a small part in feeding a growing world population. In sustainable agricultural practices, smaller sized local farms grow a diversity of crops and animals. The manure of the animals is a welcome fertilizer for the plants.

A decentralized agriculture also reduces transportation costs and CO₂ emissions. Additionally, decentralization greatly increases food security. (More on decentralization in Unit 7, section 3.)

Section 6: Reducing Deforestation and Planting Trees ²⁰

*Cut down the forest of desire, not the forest of trees.*²¹

The Buddha

*If anyone has a palm shoot in his hand on the last day he should plant it.*²²

Muhammad

*When we plant trees, we plant the seeds of peace and seeds of hope.*²³

Prof. Wangari Maathai

Forests play a vital role in maintaining the balance of the Earth's ecosystems. They provide habitat for more than half of all terrestrial species, help filter pollutants out of the air and water, and prevent soil erosion. Rainforests also provide essential hydrological (water-related) services. For example, they tend to result in higher dry season streamflow and river levels, since forests slow down the rate of water or rain run-off, and help it enter into the aquifer. Without a tree cover, the water tends to run off quickly into the streams and rivers, often taking a lot of topsoil with it. Forests also help the regional climate as they cycle water to the interior of a continent. The shrinking of the Amazon Rainforest reduces regional rainfall, which in turn threatens the health of the remaining forest and of the agricultural land in Southern Brazil. This also results in an increased fire risk.

Forests are also a significant human habitat for indigenous peoples, including in Amazonia, Indonesia and the Congo Region. It has been estimated that up to 1.6 billion people rely on forests for their livelihoods.²⁴

Forests and their soils also play a critical role in the global carbon cycle. They are major carbon sinks because, through photosynthesis, trees take out carbon from the atmosphere and store it in their woody parts. This process is referred to as “carbon sequestration”. Trees and other plants as well as soils store about 50% more carbon than what is in the atmosphere. Thus, forests play a major role in regulating global temperatures.

It is roughly estimated²⁵ that about 10-15% of global greenhouse gas emissions are due to deforestation and forest degradation.

For all these reasons, forest conservation or efforts to reduce deforestation and forest degradation are vital.

Unfortunately, there are vested interests in deforestation since it is generally very profitable, and in many countries the political and military elites are involved in it. Reducing deforestation and forest degradation therefore involves tackling corruption, illegal logging and other difficult problems. Secondly the clearance of forests for agriculture, hydro projects, mining and other economic projects is often high on poor countries' development priorities. It is difficult and ethically flawed for richer nations to say to poor developing countries that they should not clear their forests for economic development, given that this is what most industrialized countries have done.

There are several “win-win” mitigation strategies that can deliver positive environmental and social outcomes, for example, through provision of land rights and financial support for indigenous and other local communities to manage and conserve the forests they depend on for their livelihoods. This will however require increased levels of national and international political will than is currently the case, since it involves standing up to vested interest groups benefiting from unsustainable and/or illegal forest exploitation. Therefore justice, equity and the environment are inextricably linked when thinking about the role of forests and trees in the struggle to counter global warming. This is pointed out in a letter from the National Spiritual Assembly of the USA to the American Baha’i community: “The destabilization of the global climate system is in large measure a moral challenge, requiring humanity to develop a greater sense of stewardship and responsibility for the environment, as well as a greater awareness of the interdependence and oneness of all the earth’s inhabitants.”²⁶

In addition to reducing and stopping deforestation, it is possible to plant trees (afforestation) and to restore natural forests (reforestation). During its growing stage, a tree absorbs more CO₂. In this manner, trees are “carbon sinks” for industrial CO₂ emissions. Trees grow much faster in the tropics – therefore for mitigating climate change it is better to invest in tree planting in tropical countries than temperate countries (although the latter is still very worthwhile). At present, planting trees and restoring natural forests are the only strategies for removing CO₂ from the atmosphere that we can be certain will not have negative environmental side-effects, in contrast to the various potential engineering or chemical technologies that are under consideration.

Although the planting of forests can only contribute a small part in the countless efforts necessary to mitigate climate change, it is still much needed, also for their numerous other benefits.

Section 7: Garbage – an Obsolete Concept

Waste contributes to global warming in many ways. Landfills release significant amounts of methane, garbage trucks emit CO₂, and most of the things we throw away could be recycled to produce consumer goods with much less energy than from new materials. Society got used to throw away towels, napkins, plates, cups, handkerchiefs, shopping bags etc. Even reusable products and machines are usually not manufactured with longevity in mind, only with reduction of production costs.

A throwaway economy does not work on a finite planet. In many places, landfills are running out of space, and most importantly, humanity cannot afford wasting energy to manufacture and transport throwaway products. In addition, there is just not enough readily accessible lead, tin, copper, iron ore, or bauxite to sustain the throwaway economy anymore.²⁷

“The challenge is to replace the throwaway economy with a reduce-reuse-recycle economy. Officials should worry less about what to do with garbage and think more about how to avoid producing it in the first place.”²⁸

However, reducing garbage, especially compostable materials that produce methane

in landfills, is important. Some cities have started food scraps collection programs.²⁹

It is possible to develop a comprehensive reuse and recycle economy. Products can be designed so that they last for a long time, and that after their lifespan, they can be disassembled, and their materials reused again.

Section 8: Economic Changes

Mitigating Climate change demands transforming our economic system.

Our current *financial system* is based on loans and interest. It requires continuous growth to work. “Debt is the reason the economy has to grow in the first place. Because debt always comes with interest, it grows exponentially – so if a person, a business, or a country wants to pay down debt over the long term, they have to grow enough to at least match the growth of their debt. Without growth, debt piles up and eventually triggers an economic crisis.”³⁰ However, it is impossible to have unlimited economic growth on a finite planet. That’s why, tackling the climate problem requires a rethinking of our economic system.

One specific problem in the current system is that the “*external*” *economic costs* of burning fossil fuels are not incorporated in the price of fossil fuels. These are the costs of fossil fuels to society. They include the costs of cleaning up oil spills, the cost of health care for all the people who are getting sick from air pollution, and now the mounting costs incurred by natural disasters caused by climate change, etc. This cost is usually referred to as “the social cost of carbon.”

Therefore, one of the best economic tools to reduce carbon emissions is a *carbon tax* or fee imposed on the burning of carbon-based fuels. It is fair, because polluters pay for the damage caused by their emissions. It is a powerful market tool to switch to clean energy and to strengthen energy efficiency. The money raised with the carbon fee could either be distributed among the population or used to implement clean energy and to help financially poor people who may be adversely impacted by the fee. Carbon taxes should be designed so that they don’t hurt the economically poor, and it is important that they don’t exclude other regulatory measures such as putting a moratorium on all new fossil fuel infrastructure, e.g. fracked-gas power-plants and pipelines.

Most importantly, *fossil fuel subsidies* must end. “A fossil fuel subsidy is any government action that lowers the cost of fossil fuel energy production, raises the price received by energy producers, or lowers the price paid by energy consumers.”³¹

It is estimated that, “internationally, governments provide at least \$775 billion to \$1 trillion annually in subsidies”.³² These subsidies put fossil fuels at an economic advantage compared to other energy sources. Of course, it doesn’t make any sense to put public money towards finding and burning more fossil fuels at a time when it is so urgent to reduce and as quickly as possible abandon their use.

An IMF report estimates that when you include the environmental damage from oil, gas, and coal, the real annual costs of fossil fuels globally are \$5.3 trillion. Dirty energy only seems cheap if you don’t properly account for all the destruction it does.³³

The economic initiative of *divestment* is very promising. Several universities, financial institutions, charities, and religious organizations have started to divest from fossil fuels.³⁴

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