At a conference in October 2007 at the British Royal Society of Medicine, co-arranged by the International Physicians for the Prevention of Nuclear War (IPPNW), new data was presented on the catastrophic global consequences of the detonation of a very few of the world's nuclear weapons. Even a regional nuclear war with a limited number of nuclear weapons (50 – 100) would cause harm to the environment and human health on a scale previously not understood. If these estimates are correct, it sheds a new and disturbing light on the current situation with proliferation of nuclear weapons. It becomes even more obvious that nuclear weapons disarmament is of crucial importance to all states – nuclear and non-nuclear weapon states alike.

***Climate effects of a limited, regional use of nuclear weapons***

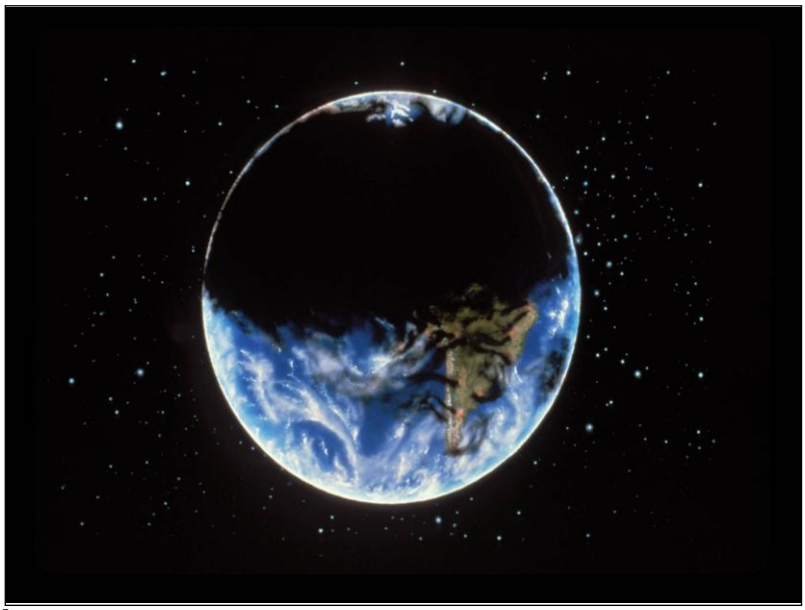
In the 1980's the term nuclear winter was common in the security debate. The term referred to the darkness and the reduced temperature that would result from a *major* nuclear war between the US and the Soviet Union.[1] Knowledge became widespread about the massive fires caused by a large scale nuclear war that would create sunlight-blocking soot in the atmosphere and thereby cause darkness, cool, bad harvest and global famine.

According to Robock[2], climate research has progressed immensely during the last decades, partly due to the climate debate, as have the technical possibilities to do detailed computer simulations of complicated climatological processes. Studies of the climate effects of major forest fires and volcanic eruptions have also brought important understandings.

The data presented by Robock is based on simulations of a scenario involving two states with large urban centres, which during a limited time detonate a total of 100 Hiroshima-sized nuclear devices in urban areas. The scenario corresponds to what could happen in an armed conflict between India and Pakistan. It is, however, interesting to note that these two states possess less than 0,1 percent of the world's total nuclear arsenals.[3]

After a nuclear explosion, a large portion of the soot particles will transfer to the stratosphere – the outer layer of our atmosphere - where they will affect climate on earth for a long time. The occurrence of soot in the stratosphere limits the sunrays – and thereby the light and warmth – that reaches earth. The result is a large reduction of temperature: during the first years about –1,25 °C and after ten years –0,5°C. The effects on the earth's climate will remain for more than a decade. The largest temperature drops would occur over land, with several degrees' drop in North America and Eurasia.

The first picture shows the earth as seen from space. This picture, that you probably recognise, was taken during a clear day in May 1969 from the spacecraft Apollo 10, heading towards the moon. In the middle of the picture you can see the California Bay and Mexico. Above the earth, a layer of clouds covers most of the US. These clouds produce all the precipitation needed for that year's agriculture.



This is what the same picture would look like if taken after a large-scale nuclear war. Thick clouds of smoke and soot would cover all of the Northern Hemisphere, bringing darkness and cold. The lack of sunlight and a notable temperature drop would lead to bad harvest and lack of food. A global famine would be the result. A large part of the larger land living mammals would die, while insects and animals living in water would have better chances of survival. It cannot be predicted if people anywhere will survive the nuclear winter, but it is likely that human civilisation would be annihilated.

*Source: National Resources Defense Council.*

***Thinning of the ozone layer***

Even a limited nuclear war, as shown by recent research, would have catastrophic consequences for the ozone layer, which protects all life on earth from the sun's harmful UV-rays. It is said that 100 Hiroshima sized bombs detonated in an urban environment would make the ozone layer about 20 percent thinner around the globe. The northern latitudes would be most severely affected, with an up to 70 percent decrease of the ozone layer during the first five years following a nuclear war. The tropical areas would be least affected.

All the smoke rising up in the stratosphere absorbs sunrays and make the air incredibly hot. This makes the ozone layer grow thinner. When the ozone layer attenuates, more harmful UV-rays from the sun reach earth, harming both human beings and vegetation. Increased UV-radiation can result

in skin cancer, eye problems and other health problems for humans. It also affects the ecosystem in waters, harming fish, shellfish, amphibians and plankton.[4]

***Effects on food and water***

The lack of sunlight and a notable temperature drop would lead to bad harvest and lack of food. A global famine would be the likely result. A large part of the larger land living mammals would die, while insects and animals living in water would have better chances of survival. The only food that could be eaten would be canned food or other food that has been secured from radioactive contamination. It cannot be predicted if people anywhere will survive the nuclear winter, but it is likely that human civilisation would be annihilated.

A nuclear war would also mean the water system would be destroyed. Almost all water would be contaminated by harmful radioactive particles and thereby extremely dangerous to drink.

In February 2008, an international seed vault was opened in Svalbard in the northernmost part of Norway. Drilled more than 100 meters into the mountain, with a constant temperature of –18 degrees C, the vault has been referred to as the Doomsday Vault. The idea is that seeds for all the world's crops would be kept in the vault, safe from natural disasters, climate change and nuclear war.

***Agricultural issues and starvation***

Farming and agriculture would be affected by a change in many climatological factors: precipitation, temperature and sunlight. In his report on the climate effects of a regional nuclear war, author Robock estimates that the agricultural season, i.e. the number of days free from frost in one year, would decrease by ten in Sweden and other northern states during the first year following a limited nuclear war between India and Pakistan. The worst part of the scenario is that the bad harvest is described as a global phenomenon. The number of days free from frost during the first year following a nuclear war varies between 10 and 30 (with a Siberian top note of a 100 days lost).

A 10-30 days shortening of the agricultural season due to a temperature drop would result in a drastic cut of the production rate and reduced availability of food worldwide. The world's total grain supply as of August 2007 is estimated at 322 million tons. With an annual consumption of 2098 million tons, this equals 49 days requirement for grain in storage. Almost 11 percent (220 million tons) of the world's grain production is subject to international trade, making the supply politically sensitive. 800 million human beings worldwide have access to a lower daily energy intake than they need.[5] A drastic decrease in agricultural produce would risk making the situation even harder for those already living below their energy needs.

It is also important to note that starvation to the extent described above would potentially lead to riots, civil wars and escalation of ongoing conflicts over scarce resources, inevitably leading to more death.[6] A nuclear war, even a limited use of nuclear weapons between for example India and Pakistan, would lead to far more devastating consequences than the immediate effects of the nuclear explosion itself.

***The doomsday vault***

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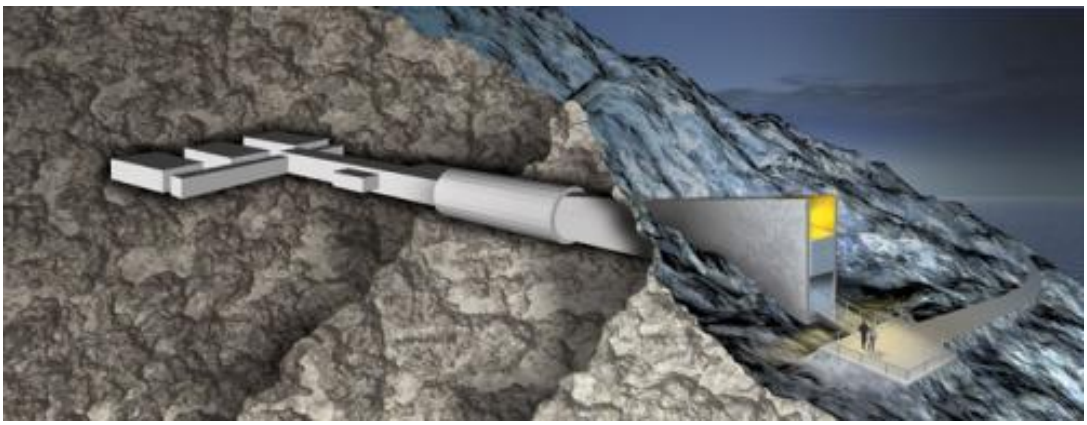

*Picture: an outline of the Svalbard Doomsday vault.*
*Source:* http://www.belowtheclouds.com/2008/02/27/svalbards-globala-frolager/

***Water related problems***

A nuclear war would also mean that large parts of water systems in the affected areas would be destroyed. All open water sources would be contaminated by radioactive fallout, making it dangerous to drink. After the Chernobyl disaster it became clear that not only water sources and ground water in the immediate surroundings of the disaster-struck area were affected. Radioactive Cesium from the Chernobyl fallout could still ten years after the accident be identified in the oceans in Northern Europe. Radioactive particles in the water risk contaminating fish and shellfish in these areas.[7]

Those surviving a nuclear attack must be aware of the fact that radioactive particles cannot be boiled or purified by chemical methods. The safest would be to find drinking water from preferably covered wells as far away from the epicentre as possible. Yet, the author of the book Nuclear Survival Skills, Cresson H. Kearny, claims that more people would be killed by water borne diseases than by water contaminated by radioactive fallout.[8] A nuclear war will also make it harder for people to take care of their hygiene. The water will be polluted, people will live in tight quarters and it will be hard to find effective waste management systems. Insects and microorganisms with strong resistance to radioactivity will increase in numbers. Bad hygiene and many insects will lead to a rise in contagious disease – many of which are water borne.

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7 http://www.vattenportalen.se/fov_problem_radioaktivitet.htm
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