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# Being Present with the Past and the Future at Nuclear Weapon Test Sites: A Challenge for Treaty on the Prohibition of Nuclear Weapons (TPNW) Effectiveness

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### Introduction

I want to give you some background information about the nature of nuclear weapons and their impacts: what happened at test sites, what nuclear testing consisted of during the Cold War, some of the legacies of Cold War nuclear testing, and some behaviors of nuclear weapon states when they close test sites.

My primary area of research is the Global Hibakusha, the people who have been exposed to radiation since the 1945 nuclear attacks in Nagasaki and Hiroshima. This group includes people who live downwind from nuclear weapon test sites, people who live near production sites like plutonium production sites, uranium mining sites, uranium processing sites, and nuclear waste sites, and people who live near nuclear accident sites.

Today, we're going to look primarily at people who live near

nuclear weapon test sites and who were exposed to radiation because of nuclear weapon tests.

### **Characteristics of Nuclear Testing, Weapons, and Weapon Effects**

Both underground and atmospheric tests release the similar amounts of radiation. In underground tests, however, the radiation from the detonation stays in the soil and in the water table at the test site. Consequently, it lasts for a long time and penetrates further into the local ecosystem. Atmospheric tests, in contrast, produce large numbers of radioactive particles that form mushroom clouds. As these clouds drift, particles fall out and spread radiation, often quite far from the test site. This spread of radiation from atmospheric testing is global; there's no place on Earth that has not experienced radioactive fallout from these tests.

Atom bombs (A-bomb) are fission weapons, and H bombs are fusion weapons. A-bombs were used at Hiroshima and in Nagasaki, and H bombs are much larger. As fission weapons, A-bomb release energy through the splitting of nuclei of trillions of atoms in less than a second. As fusion weapons, H bombs release energy by fusing the nuclei of two atoms together.

Nuclear weapon effects are of three types: blast, heat, and radiation. Blast is the force that's released by a nuclear weapon, and heat denotes the incredibly hot temperatures generated by the explosion. For radiation, there are two varieties: prompt radiation and residual radiation.

When a bomb explodes, prompt radiation is produced and lasts less than a minute. This radiation extends outward from the area where the bomb was detonated and becomes uniformly and progressively

weaker as the distance from the detonation site increases. If you're close enough to receive an incredibly high dose of radiation, it can be deadly, cause later diseases, and damage DNA as well as damage bodily organs.

We also call residual radiation "radioactive fallout." This fallout is produced as the mushroom cloud resulting from the detonation drifts and the cloud's radioactive particles fall back down to Earth. At first the cloud rises straight up from the detonation, but eventually it blows like any cloud. When the nuclear explosion happens, a lot of material is going up; that's why you get a mushroom head at the top because the cloud is filling up with particles. If the fallout occurs with rain, rain strips these particles out of the cloud and causes the particles to fall in larger amounts, in Hiroshima producing rain that was black because of the soot from the fires ("Black Rain"). Once the fallout falls to the ground, it stays radioactive for different periods of time depending on what chemical it contains. You may experience radioactive particles while Black Rain is falling, or you may experience these particles weeks later, when you come to a place with fallout still on the ground.

Radiation that comes in the form of fallout stays dangerous for a much longer time than prompt radiation which produces only external exposure. With prompt radiation, rays penetrate the body and damage cells and organs to make people incredibly sick, but the radiation isn't present in their body after a minute. The internal exposure caused by residual fallout concerns particles from the fallout that you get inside your body. You can inhale the particles, swallow them, or get them inside your body through cuts. Once these particles enter your body, they can stay there. Different kinds of radioactive fallout particles tend to be placed in different parts of the

body because the body thinks of these as chemicals to be used. For example, strontium-90 (a fallout particle) tends to concentrate in the bone, while iodine-131 (another fallout particle) tends to concentrate in the thyroid. Radioactive particles stay radioactive for ten half-lives; a half-life denotes the period of time across which the particles lose half of their radioactivity. Some particles, like strontium-90 or cesium-137, will remain dangerous for about 300 years and will continue moving through the ecosystem and may end up in the bodies of generations of people.

## **The History of Nuclear Testing**

Following Hiroshima and Nagasaki, we were afraid that there would be a nuclear war which would expose people to large bursts of radiation. Instead, there have been 2000 nuclear tests which have exposed people to fallout. Except for the soldiers who took part in tests, few were close enough to the explosions to be given a large dose of external radiation.

Nuclear weapons have been tested on every continent, except for South America and Antarctica. The place with the most tests worldwide has been Nevada in the United States, where over 900 nuclear weapon tests have been conducted. The former Soviet Union used Kazakhstan as its primary test site and conducted almost 500 tests there (over 700 at all Soviet test sites). Many countries have used islands in the Pacific Ocean in order to keep fallout away from populated areas and from populations that were considered politically important.

There is often a colonial, rather than scientific or military, approach to selecting test sites. For example, the UK and France, the third and

fourth nuclear weapon states, never tested a nuclear weapon inside their own borders and instead used colonial or post-colonial areas. This was to keep the radioactive fallout from affecting citizens of those nuclear countries.

One way to understand nuclear weapons (and I'll relate this in a second to the colonial nature of nuclear weapon test sites) is their size. We determine the size of a nuclear weapon by what is called its yield, or how many tons of trinitrotoluene (TNT) is equal to the force produced by the weapon's explosion. For example, here in Hiroshima, the amount of force of the 1945 A-bomb was about 15 kilotons. That is, it would have taken 15 tons of dynamite to make an explosion with an equal amount of force. Let us compare the difference in the yields of H bombs. The Tsar bomb by the Soviet Union was the largest test of a hydrogen bomb at 50 megatons; its force was equal to 50 million tons of TNT. There is no limit to how large you can make hydrogen bombs, unlike regular atomic bombs. H bombs are not just larger; they create much bigger fallout clouds.

To show you how this fallout is colonially determined, look at the US's testing. The US had over 900 tests in Nevada and only 89 tests on Pacific islands. But when we look at the mega tonnage, the amount of energy released by the tests, the Nevada tests released only 86 megatons, while the Pacific tests in the Pacific released 254 megatons -- well over two thirds of the total energy released by US nuclear testing. The United States concentrated as much as possible of its fallout and impact in the Pacific Ocean, distant from Americans inside the United States. This is how you can see that the Pacific islands were understood as a colonial space; they and their populations were considered expendable.

In the Bravo Test, conducted on the Marshall Islands, for instance,

the fallout cloud extended several hundred miles into the Pacific Ocean, engulfing atolls populated with people who had not been evacuated. At Rongelap, over 120 miles away from the detonation site, the exposures of the people there were equivalent to people who were two miles away from the detonation site in Hiroshima. To show you how deadly fallout clouds from hydrogen bombs can be, the US military determined that if this same bomb had been detonated over Washington, DC, all of the population of Baltimore, all of the population of Philadelphia, and 50% of the population of New York would have been killed by radioactive fallout if they were not evacuated immediately. Hydrogen bombs have the ability to kill tens of millions of people via radioactive fallout.

### **The Impacts of Nuclear Testing**

The primary impact is of course, illness and early mortality — for instance, cancers or immune system disorders. There were very few cases of people who died quickly because they were exposed to large amounts of fallout. Many people continue to live in places with large amounts of radioactive fallout and to experience ongoing illnesses.

Another impact is forced displacement. Typically, people evacuated from radiologically contaminated areas are placed in temporary housing after a bomb detonation and so lose their homes, family networks, and community networks.

Some people, however, are allowed to return to their homes after they were evacuated. Near the former Soviet test site in Kazakhstan, where both A and H bombs were tested, there are several such villages 30, 40, and 50 kilometers away. Since these areas are still extremely contaminated with radioactive fallout, you see more illness

in the second, third, and fourth generations of residents after the detonation. People are still being exposed to radiation, still getting fallout inside their bodies, and still developing illnesses. In addition, the people in these villages consume food contaminated by fallout; they grow food in their gardens and raise animals that graze on their lands.

There's also a disruption of traditional culture and knowledge. In Australia, where the UK first tested nuclear weapons, the Outback, the area where many indigenous (or aboriginal) peoples live, became contaminated. People subsist in this area by passing down knowledge gathered for generations through songs — for instance, where to find water in each season, what the migration patterns of animals are, and when to hunt certain animals. When the British decided to test nuclear weapons here, they moved whole communities 200 kilometers from their traditional lands. But if you take people away from a place where they have knowledge about the local ecosystem, then they have no idea where the water is or where the food is. Consequently, these indigenous communities began to struggle. Many people ended up in government housing — a move that requires a shift from traditional lifestyles and food sources and toward a dependence on processed foods. Not only does this shift alter the health of the community, but it also severs the connections of these communities to their ancestors. When you can no longer live where your ancestors lived and maintain the graves of your ancestors, psychological damage can follow.

### **Limited Responsibility of Nuclear Weapon States for Testing Sites**

Some nuclear weapon states did try to clean up, or remediate,

their sites when they closed them, but these cleanups were typically minimal and states more frequently simply abandoned test sites.

For instance, when the British closed their test site in southern Australia, they merely erected a sign warning of radiation hazards and advising against permanent residence in the area. However, this sign was in English, and the indigenous people living there at the time did not speak or read English. When the French abandoned their site in Algeria, they merely buried all of their radioactive material underground, providing no barriers or warnings for the contaminated area. Since Algerians frequently excavate these buried materials in order to gather and sell copper and other valuable metals, much radioactive metal has appeared in markets throughout western Africa. Likewise, at Enewetak, a US nuclear test site in the Marshall Islands, the US conducted a test in an underground shaft and then buried their contaminated equipment in the shaft, closing it with a concrete dome. Radiation has been seeping out from this shaft and penetrating throughout the area, and there are very high levels of plutonium in the lagoon of the atoll. In addition, because of rising sea levels and climate change, water is beginning to seep into and destroy the shaft; there is fear that the shaft will disintegrate and release radioactive material into the local ecosystem.

Even when remediation is seemingly more extensive, they nevertheless are still limited. After the Bravo Test, for example, the United States wanted to resettle people in Rongelap and so conducted a remediation of the atoll for several years. Although they built several new houses and moved people back to Rongelap, they told everyone that they could only live in and eat fish from the remediated area of the atoll because the rest was too dangerous. Obviously, people who live near the ocean and who live primarily off



of fish realize that a fish that you caught from this area hasn't always lived there. Because fish swim from one area to another, residents of Rongelap began to get sick again. When the residents asked to be evacuated again because of the illnesses, the US refused. In 1985, Greenpeace moved the people of Rongelap to Majuro, the capital island of the Marshall Islands, where most of them still live today.

There has also been avoidance of compensation. For example, the French instituted a program to compensate people exposed to radiation from French nuclear testing, but more than 90% of the people awarded compensation were French soldiers exposed to radiation via participation in nuclear testing. Among the indigenous populations of French Polynesia and Algeria, I believe, fewer than ten percent of applicants have been granted compensation. Similarly, the US allocated funds to compensate the people in the Marshall Islands, for example at Rongelap or Enewetak, for having lost property and experienced illnesses. A Nuclear Claims Tribunal in the Marshall Islands took testimony from people about what had happened, and the United States gave a certain amount of money to pay off the claims. Instead of paying the claims directly, however, the US placed the money in a Wall Street account, and the interest of that account was used to pay claims annually. Because the money disappeared as the stock market fluctuated, most of the people awarded claims by the Nuclear Claims Tribunal received on average less than 10% of the money they were awarded.

## **Problems with Enforcement of Article 6 of the TPNW**

Article 6 (1) requires that assistance be given to individuals affected by nuclear testing, including medical and psychological treatment.

Article 6 (2) requires remediation of environmental damage and removal of radioactive contaminants.

Nuclear weapon states have easily avoided these requirements by ignoring the long-term presence and behavior of fallout in the ecosystem. Instead of investigating how much fallout is embedded in the system, they have used Geiger counters to measure external radiation. The danger of fallout to local residents is that they will get particles that are on the ground inside their bodies. However, when a Geiger counter is held up in the air, it can sense radioactivity on the ground only if there are a lot of particles on the ground. Otherwise, it does not pick up very much of the ground-level radiation. Assessments of how much danger there is to people from radiation in the ecosystem are done by measuring external radiation levels away from where the radiation really is, in soil, plants, and water. It's a way of saying there is safety when there is actually risk.

Remediation by its very nature can be only so effective because radioactive particles exist for so long. For instance, since cesium-137 will last 300 years, putting it into plastic bags (as in Fukushima) is simply moving it somewhere; it never disappears. In addition, once these particles enter into the ecosystem, they cycle through the ecosystem, going into the soil, being absorbed by plants, being digested by animals who eat the plants, and returning to the soil when animals die.

Thus, decontamination is temporary and can be done in a way that makes it appear that there's action being taken when there will only be a short-lived effect. For TPNW Article 6 effectiveness, we have to face the facts that nuclear weapon states do not have a good track record and that they have rarely acted in good faith at contaminated sites, routinely treating indigenous populations and ecosystems as

disposable.

### **Conclusion: Measures for the Future**

Strong enforcement measures that examine not just levels of radiation with Geiger counters, but levels of radiation inside plants and soils as well as the types of long-lived contaminations faced by communities are necessary future measures. Up to this point, nuclear weapon states have been very good at avoiding such measures, and if they enter into treaty obligations, it is doubtful that they will fulfill these obligations in good faith.

### **Response by Discussant Dr. Hibiki Yamaguchi (Research Center for Nuclear Weapons Abolition, Nagasaki University)**

My first point is related to Article 6 of the TPNW. As Professor Jacobs said, Article 6 is about environmental remediation and victim assistance. The states that have signed the treaty include countries affected by nuclear tests, for example, Kazakhstan, Kiribati, and Algeria. My question is about how these countries will implement the clause for environmental remediation. What kinds of measures can these countries adopt to achieve environmental remediation? Also, how can international society help these countries implement this clause? In addition, I would like to bring the participants' attention to the fact that the TPNW mentions the issue of indigenous people in the preamble of the treaty; this text recognizes the disproportionate impact of nuclear weapon activities on indigenous peoples. How will indigenous peoples' activities, thoughts, and/or experiences have an impact on the implementation of Article 6?

My second point is about the role of Japan. As today's participants know very well, the Japanese government has refused to take part in the TPNW even as an observer state. But as the only country that has suffered from the wartime use of nuclear weapons, Japan is especially obliged to give effective feedback to international society and to countries affected by nuclear tests about how Japan has been helping victims of nuclear detonations, especially the Hibakusha. I would like to ask Professor Jacobs to give us some suggestions about the role of Japan in terms of this issue.

The third point is a comment, rather than a question. This seminar series is related to the SDGs, the Sustainable Development Goals. Almost all of the SDGs or the items in the SDGs are related to the after-effects of nuclear tests. For example, the third goal addresses ensuring healthy lives and promoting well-being for all ages, and the sixth goal focuses on ensuring availability and sustainable management of water and sanitation for all.

Finally, stemming from my collecting and publishing of Hibakusha testimonies, I would like to know what similar activities have been conducted by people in areas affected by nuclear tests, especially activities designed to record the victims' experiences for the future generations. If these activities have been conducted, how have they been carried out, and how are they related to the reconstruction of communities? As Professor Jacobs has explained, the problem is not only about physical destruction but also about the dissolution of society.

## **Response by Professor Jacobs to Discussant**

Many test sites, for example, those in the Pacific, are grappling

with climate change. While remediation of nuclear test sites is critical to them, for many residents, climate change is the primary threat to the current generation. Consequently, a lot of their activities are focused on raising awareness about climate change; they often use climate change to attract global attention which they can then use for addressing the impacts of nuclear testing. This has especially been a strategy in the Marshall Islands. Twenty years ago, the focus of places like the Marshall Islands and French Polynesia was very much on getting remediation and getting attention for what happened to them. But the strategy really has shifted because of the threat posed by rising sea levels. In the Marshall Islands, there are many atolls where no land is more than two or three meters above sea level. Because of this urgent crisis, the Marshall Islands have focused on climate change more than the TPNW.

A lawsuit was brought in the world court against nuclear weapon states for not disarming; it was dismissed and not heard. In addition, there were legal steps taken to try to compel nuclear weapon states to meet their obligations under the Non-Proliferation Treaty (NPT), but these steps never became an actual case.

I agree with you that it's politically really unfortunate that Japan is focused more on its relationship with the United States than on the legacy of the people who endured the nuclear attacks in Hiroshima and Nagasaki. Probably all of us have been asked by people we know from other countries: why hasn't Japan signed the TPNW? It seems counterintuitive. We all understand the political reality of why Japan is making the choice that it's making. It's a politically expedient choice.

What you have in Japan's response to the Fukushima disaster is all of the wrong behaviors of how to respond to radiological

contamination of a community. These behaviors include: trying to move people back into contaminated areas, trying to create political pressure to support farmers and fishermen in those areas rather than compensating them directly for their loss of income because of the disaster, and using external levels of radiation to assert that places are safe when there's still large amounts of particles embedded in the ecosystem. These types of behaviors allow nuclear weapon states to avoid their obligations or to minimize the seriousness with which they take these obligations. One of the main things Japan could do, besides becoming a signatory to the TPNW, would be to reorient itself toward its current radiological crisis. Staging an Olympics in order to create positive public relations and diverting money and construction away from the area impacted by the tsunami and the earthquake reinforces the political value of all of the wrong behaviors.

I really want to address your final point about memory culture. I live in Hiroshima; you're in Nagasaki. Both cities have very active memory cultures, supported by communities.

I'm an employee of the city of Hiroshima. All of the many test communities that I have worked in have this longing for some kind of organized memory culture for their experiences as we have in Hiroshima and Nagasaki. I notice in Hiroshima, as you may notice in Nagasaki, that people from these communities annually attend our commemorations. An indigenous artist from South Australia also recently placed a large sculpture in the Peace Park in Nagasaki. In most of these communities, there's virtually no institutional maintenance of memory of the experiences of individuals or of the impacts of the events themselves. The testimonies of the Nuclear Claims Tribunal were only saved by the intervention of a town government in Spain which digitized the materials to prevent them

from disintegrating.

There are active efforts by nuclear weapon states to erode these memories. In the United States, there is a proposal to create a national park near the Manhattan Project. I've been involved with communities at Hanford, Washington and the Nevada Test Site who seek to have this park include stories of the health impacts of the creation and production of nuclear weapons. But the National Park Service is not interested in including these stories.

Likewise, just last week in England, a garden was planted to commemorate those who had suffered from British nuclear testing in Australia. The town where this garden was located forced the Arts Council to remove it because highlighting suffering caused by British nuclear testing was considered insulting to the UK government and military. The memories of the communities affected by nuclear testing are really only held by community members and are not being actively passed down to subsequent generations; there is no support for passing down these memories. I wish as a global community, we could provide support for establishing some memory culture around the experiences of individuals and communities affected by nuclear testing, so that these experiences do not disappear with the generation that lived through them.

### **Response by Professor Vesselin Popovski (Soka University)**

We have the five permanent members of the Security Council who control all aspects of international peace and security. However, we haven't had much cooperation in the last five, six, or even more years between them for various reasons. We probably were more optimistic back in the 1990s than we are today, exactly because of the lack of

international cooperation and the multilateralism today. How do you see your specific research relating to international debates about nuclear power, especially to the five initial original nuclear powers?

Obviously, all of us internationally condemn nuclear weapons, but often the discussion jumps to nuclear energy as a source of energy that could be a solution to fossil fuel usage, to pollution, and to CO<sub>2</sub> emissions. From the same nuclear reaction, the chemical transformation of uranium into plutonium, we have the most dangerous weapons, but many countries will argue that this chemical reaction is the best way forward; otherwise, fossil fuels continue to pollute the planet, producing climate change and natural disasters. Is there a danger of transposing our condemnation of nuclear weapons and tests into stigmatizing the use of nuclear energy by civilians?

### **Response by Professor Jacobs to Professor Popovski**

By looking at impacts on communities of the activities of, especially, the big five nuclear weapon states, I seek to transform the history of nuclear weapon states into a global history, rather than a series of national histories. When you separate the effects on communities of nuclear weapon testing into national histories, you make them look less important. An emphasis on national history is the usual way that these communities have been studied: for instance, victims of Soviet nuclear testing, victims of US nuclear testing, and victims of French nuclear testing. By separating these communities of victims from each other, you see these groups as not that large a number of people and not that large an area of land affected.

When you weave these communities together into a global history, however, you begin to understand that millions of people have been



affected and that the distribution of fallout was global. Consequently, you begin to see that even though the specific actions come from different states, there is one trend of the use, testing, and detonating of nuclear weapons and their impact on human beings and the ecosystem, rather than just these select human beings or just that ecosystem of one test site area.

Globalizing this history thus makes it easy to begin to see nuclear testing and its effects as a larger event. For example, we look at the Cold War as a period of time in which nuclear weapons were not used. Statistically, however, between 1946 and 1989, a nuclear weapon was being detonated every 8.6 days; nuclear weapons were going off constantly during the Cold War. Even though these weapons were not being used in warfare, there were weapon effects being experienced by lots of people in lots of places because of the size of the weapons and because of the nature of the radioactive fallout. By stripping away national boundaries and by looking at weapon effects as genuinely affecting people, even if these effects do not occur in wartime, we can begin to see the impact on actual human lives.

When it comes to nuclear power and nuclear weapons, it's not easy to separate them. Nuclear reactors were invented to make plutonium; they were invented by the Manhattan Project.

With nuclear power, there's far more carbon impact than is often suggested. When you include the uranium mining, the uranium milling, and the 100 years that it often takes to decommission nuclear power plants — there's a small carbon footprint during the period in which a plant operates, assuming there's not an accident — but on the front end and back end, there's a much more significant carbon footprint.

The most significant thing human beings have ever achieved is

manufacturing nuclear waste. We have hundreds of thousands of tons of spent nuclear fuel that needs to be contained for over a hundred thousand years. Long after our governments, cities, and languages are gone, the tons of spent nuclear fuel will be here. 50,000 years from now, that's what will be left from our civilization. We need to take care in making massive amounts of this very dangerous material and in telling ourselves that we'll be able to safely contain it. We don't have a good track record.

Even when nuclear reactors are used to generate electricity, they are still manufacturing plutonium. We can bury this waste underground. The plutonium in those fuel rods is militarily viable for tens of thousands of years; there may be people who dig up our underground nuclear weapon burial sites in 10,000 years in order to separate that plutonium and make nuclear weapons.

Since there is no clear separation for me between nuclear weapons and nuclear energy, I would suggest that the way to deal with our current situation in terms of fossil fuels is through actual renewables and dramatic conservation, rather than wasting energy the way our societies do.

## **Question and Answer**

### **Q1 Black Rain Trials**

Currently, Black Rain is in trial. How should this restoration process function? Should there only be monetary compensation, or should there also be some other form of restoration?

## **Answer**

Regarding Black Rain, you're compensating people for what happened to them over 70 years ago. But clearly, as with any kind of harm, especially when it's been neglected for a long time, I think apology is always an important thing; for people to understand that they have dignity and need to be respected.

The other thing to take from these Black Rain trials is establishing a precedent that people who live with fallout, even far away from areas where the burst of radiation was, suffer from health problems and need those health problems to be recognized and addressed. This precedent needs to be proactively applied in other places. For example, here in Japan, we need to apply this sensibility to Fukushima; we need to be concerned about people who are being moved into towns where radiation levels are said to be low because externally measurable levels are low. These people are being moved into places where there are still a lot of particles. If we're telling the people exposed to Black Rain that they were damaged and harmed by radioactive fallout, we should not be actively putting more people into that same situation.

## **Q2 Compensation to Victims**

Could you tell us about compensation to victims of nuclear tests? Are there any discussions about compensation for indigenous people whom nuclear states have so far avoided compensating? Do victims receive any compensation from Russia and Kazakhstan?

## Answer

Essentially, almost all of the compensation that exists for nuclear weapon test sites exists for employees of the government. There's a compensation program in the United States that is up for renewal right now, and there's a compensation program in France. Most of the recipients are people who were employed in the nuclear weapon complexes, be it as workers, as technicians, or as soldiers. Very little of this compensation has been given to the "downwinders," the people where the fallout clouds drop. Some people in the United States are entitled to small amounts of compensation from living near the Nevada nuclear weapon test site. There's an effort now to expand that into a larger area of people who are entitled to compensation. In the US, this means one-time, small payments — \$50,000 or less, which is not really substantial in the face of US healthcare costs. In France, this compensation has essentially not been offered to people living in the indigenous communities of French Polynesia and Algeria.

There definitely needs to be more comprehensive compensation, and it needs to be taken beyond the nuclear weapon states into far-distant test sites. There's really been no compensation by the British in Kiribati, where they tested thermonuclear weapons with very large fallout clouds. There's a tiny amount of compensation in Kazakhstan, to the people who live near there. But, in general, there really is not much compensation for these people. Test sites are selected because of the lack of political agency of the local communities, and so the lack of compensation reflects that lack of agency yet again. This is one of the reasons that the treaty is important. It could be a mechanism for instituting compensation and also for raising

awareness about the need for compensation.

When it comes to indigenous peoples, sometimes there is slight remediation of the site or some compensation — for example, for the Marshallese. But, in general, these communities are not in a position to bargain, and it takes political power to receive compensation. That's why a nuclear weapon state's citizens who worked for the nuclear weapon complex or who were in the military are the ones who obtain compensation; they have the power to bargain. Very few people whom I've met in many of these communities have any expectation that they will be compensated in any way.

This compensation varies from place to place. For Kazakhstan, the Soviet Union doesn't exist, so there's nobody obligated to pay compensation. It's not the Kazakh government that did this to people, and the Russian government claims: we didn't do this; it was the Soviet Union.

### **Q3 Awareness of Victims**

Do residents in Russia and Kazakhstan know that their places are contaminated by radiation? The situation is the same in China too. You talked about how some of these victimized groups don't really have this memory culture that we have, for example, in Hiroshima or Nagasaki. Are there cases for example, where the victims don't even know that they are victims? How well is the nuclear history known in some of these areas?

## Answer

In terms of knowledge held by victims, it really varies. It depends on the remoteness of the place. For example, on Christmas Island in Kiribati in the Pacific, where both the British and the US tested hydrogen bombs, when I visited there, people didn't even have information about the size of the weapons that had been detonated there and the health impacts that come from radiation. We were told that British soldiers, British nuclear veterans, who came there with the BBC to film a piece about their exposures told the local people that they probably had illnesses related to the nuclear testing. The residents were not otherwise informed by the British about the nature of the testing and possibly related illnesses. In other places, there's an incredibly high level of information; people who live with this radiation are well aware of it. For example, at some of the small villages surrounding the test site in Kazakhstan, it was astonishing to me how much elementary school children knew about testing in other sites around the world and how much people had adjusted their farming and livestock practices to reflect their proximity to the Kazakh test site.

In many places where people live with radiation, they adjust because they see the impacts in their daily lives. One of the places where you can see this a little bit is actually in a place like Norway, or Sweden, where the Saami community has been devastated by radiation from the Chernobyl fallout cloud. The Chernobyl fallout cloud came down in large quantities in northern Scandinavia, and the Saami community mostly survives via reindeer herding. Reindeer primarily eat lichen, a plant that gets nutrients from the air and so is a bio-accumulator of radiation; it concentrates radiation more than

most plants. Therefore, the reindeer become highly contaminated, and there is an impact on the traditional culture, the traditional practices and diets, of the Saami community. For example, in one anthropological account, a resident talked about how the Saami have developed three different grades of reindeer meat calibrated according to degree of contamination and who is eating the meat. The most contaminated meat is eaten by the elderly, less contaminated meat is eaten by the adults, and meat that is purchased from outside the area is eaten by children.

Thus, people are proactive in adapting as much as they can to what they understand. However, this adaptation differs from place to place. But needless to say, when people live with something that causes illness in the community, they pay a lot of attention to how that illness occurs, to where people get sick, and to how they get sick. People then take steps to manage the causes of this illness, even if they don't have the same medical frameworks or radiological understanding that we do.

#### **Q4 Implementing TPNW without Large Nuclear Powers**

What do you think about the possibility of implementing the TPNW without the willingness of large powers such as Russia and the United States? Without those powers, what are the chances the TPNW being successful?

#### **Answer**

In terms of abolition of nuclear weapons, there's no effectiveness of the TPNW if there's no willingness from the states that possess,

deploy, and threaten to use the weapons. There's certainly no way to abolish nuclear weapons if nuclear weapon states brandish their weapons. Also, in virtually all of these states, there is continuous commitment of funding to modernizing weapons. So they're going in the opposite direction from abolition.

In terms of remediation, there is an opportunity for the other nations who have signed the treaty to commit funds to at least some fundamental work in these contaminated communities and ecosystems. So there is an opportunity to make a difference in terms of the concerns of Article 6, the wellness of communities, the remediation of their ecosystems, and the provision of medical and psychological care for people. It's incumbent upon us to try to do what we can for these communities because that's something we can do as non-nuclear weapon states.