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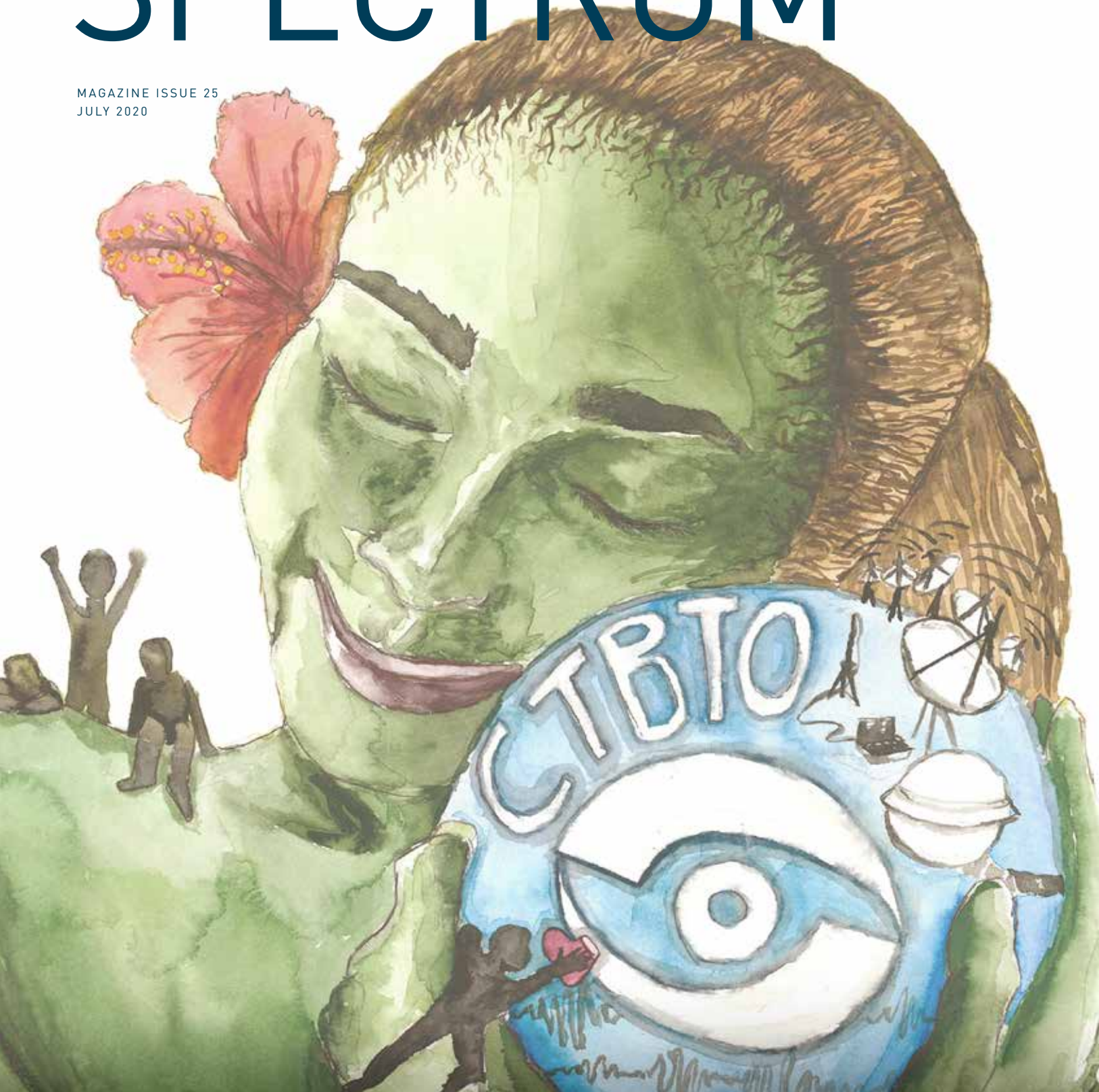
# CTBTO SPECTRUM



CTBTO  
PREPARATORY COMMISSION

PUTTING AN  
END TO NUCLEAR  
EXPLOSIONS

MAGAZINE ISSUE 25  
JULY 2020



TOWARDS THE 10TH NPT REVIEW CONFERENCE



#### COVER IMAGE:

*Painting by Jana Swanepoel (age 16) from Namibia. Jana's art was selected as one of the top twelve entries submitted to the 2018-2019 Global Scholar Art Campaign organised jointly by the CTBTO and Peace and Cooperation (Paz y Cooperación).*

*(The original painting was gifted to CTBTO Executive Secretary Lassina Zerbo by the artist and decorates his office in Vienna.)*

*Further information about the art campaign available on page 32.*

## The Comprehensive Nuclear-Test-Ban Treaty (CTBT) bans all nuclear explosions.

**It opened for signature on 24 September 1996 in New York.**

As of June 2020, 184 STATES HAVE SIGNED THE TREATY AND 168 HAVE RATIFIED it. Of the 44 nuclear capable States which must ratify the CTBT for it to enter into force, the so-called Annex 2 countries, 36 have done so while eight have yet to ratify: China, the Democratic People's Republic of Korea, Egypt, India, Iran, Israel, Pakistan and the United States.

The PREPARATORY COMMISSION FOR THE COMPREHENSIVE NUCLEAR-TEST-BAN TREATY ORGANIZATION (CTBTO) consists of the States Signatories and the Provisional Technical Secretariat. The main tasks of the CTBTO are to promote signatures and ratifications and to establish a global verification regime capable of detecting nuclear explosions underground, underwater and in the atmosphere.

The regime must be operational when the Treaty enters into force. It will consist of **337 MONITORING FACILITIES** supported by an International Data Centre and on-site inspection measures. As of June 2020, 300 facilities of the International Monitoring System (IMS) are certified.

# TABLE OF CONTENTS

- 2 **EDITORIAL**  
CTBTO Executive Secretary Lassina Zerbo
  - 4 **CONTRIBUTORS**  
to this issue
  - 6 **TREATY STATUS**  
CTBT signatures and ratifications
  - 7 **STATUS OF CERTIFIED IMS FACILITIES**  
Certified International Monitoring System facilities
- 

## THE 10TH NPT REVIEW CONFERENCE AND THE CTBT

- 8 **NPT AND CTBT: A KEY RELATIONSHIP IN TOUGH TIMES**  
by CTBTO Editorial Team
  - 10 **THE CTBT: REBUILDING TRUST IN THE MULTILATERAL NUCLEAR REGIME**  
by CTBTO Editorial Team
  - 16 **GEM DECLARATION**  
GEM Declaration June 2019
  - 18 **THE CTBT AND THE 2020 NPT REVIEW CYCLE: CHALLENGES, RISKS, AND OPPORTUNITIES**  
by Sarah Bidgood
  - 20 **TOWARDS A REAL INTER-GENERATIONAL DIALOGUE: THE CTBTO'S EXPERIENCE**  
by CTBTO Editorial Team
- 

## VOICES FROM THE FIELD

- 24 **75 YEARS AFTER TRINITY: A LEGACY OF HARM AND HOPE**  
by CTBTO Editorial Team
- 28 **LIVING WITH THE NUCLEAR TESTS: THE SEMIPALATINSK STORY**  
by Togzhan Kassenova
- 30 **GIVING A SECOND LIFE TO SENEGAL'S AUXILIARY SEISMIC STATION**  
by Mapathé Ndiaye
- 32 **GLOBAL SCHOLAR ART CAMPAIGN**  
organised by CTBTO and Paz y Cooperación



# Editorial

**LASSINA ZERBO**  
CTBTO Executive Secretary

It's been a while since we brought you CTBTO Spectrum, and much has happened in the meantime.

The COVID-19 pandemic has thrust the world into an unprecedented crisis – one that underscores more than ever the vital need to tackle global threats with a unified, multilateral approach, infused by solid science. For several weeks the vast majority of CTBTO colleagues worked remotely, after our headquarters closed to all but a skeleton presence in line with our Host Country's measures to slow the spread of the virus.

Yet I'm proud to say that thanks to the tenacity and dedication of both our own staff in Vienna and the network of member-state colleagues who maintain International Monitoring System (IMS) facilities across the

globe, the CTBTO's core operations have been maintained without interruption. The data has kept flowing and the analysis has continued unabated, keeping our promise to ensure no nuclear explosion can go undetected.

We will emerge from this pandemic into a changed world. We do not yet know exactly what form it will take, nor whether the crucial need for preparedness, international collaboration and science-driven policies that COVID-19 has so clearly demonstrated will galvanise shared approaches to other urgent global challenges.

Few of those challenges are more pressing than nuclear non-proliferation and arms control, which in recent years has seen a clear and dangerous erosion of treaty-based norms. Tensions are high and trust is low as we mark the 50th anniversary of the landmark Treaty on the Non-Proliferation of Nuclear Weapons (NPT) and approach its 10th Review Conference. This special issue of CTBTO Spectrum throws a spotlight on issues vital to the 10th Review Conference – postponed because of the pandemic and now due to take place by April 2021 – and the essential place of the Comprehensive Nuclear-Test-Ban Treaty (CTBT) within the nuclear non-proliferation and disarmament framework.

## **STRENGTHENING AND PERFORMING**

Since our last edition of CTBTO Spectrum in September 2015, four more states – Myanmar, Eswatini, Thailand and Zimbabwe – have ratified the CTBT, and Tuvalu has signed. The total of States Signatories now stands at 184, reinforcing the CTBT's continued status as one of the world's most widely supported arms control treaties. In the same period, North Korea has conducted three more nuclear tests, bringing its total to six. The IMS detected all of them, with the most recent, on 3 September 2017, picked up by over 134 IMS stations. The CTBTO has continued to build up

its verification network and strengthen other important infrastructure. In December 2019 we reached the milestone of 300 certified IMS facilities, with the addition of infrasound station IS01 in Argentina and radionuclide laboratory RL14 in South Africa. Just over a year ago we inaugurated our brand-new Technology Support and Training (TeST) Centre in Seibersdorf, Lower Austria, a hub for storage, maintenance and testing along with top-level training facilities. The TeST Centre contributes to all elements of the verification system of the CTBT: the IMS, the International Data Centre (IDC) and the On-Site Inspection (OSI) capability. We also opened our fully refurbished, state-of-the-art Operations Centre at our Vienna headquarters.

The 2019 Science and Technology (SnT) Conference was our largest SnT conference yet, with 1200 participants convening to support the exchange of knowledge and strengthen the engagement of the scientific communities working in test-ban monitoring. And in the spirit of my personal commitment to the International Gender Champions campaign to break down gender barriers, I'm heartened to report that the CTBTO's Provisional Technical Secretariat has reached gender parity at the directors' level.

## **BOLSTERING THE SCIENCE-DIPLOMACY NEXUS**

Given the importance of the 10th NPT Review Conference and the delicate state of the regime, for this issue of CTBTO Spectrum we have interviewed a broad range of experts – including several members of our Group of Eminent Persons (GEM) – for their reflections on the enduring role of the CTBT and its potential to rebuild trust in an atmosphere of international tension. A core theme that emerges is growing mistrust between states, and the erosion of the classic arms control architecture rooted in negotiated treaties and agreements.



Ahead of the Review Conference, we must remind ourselves that these carefully crafted treaties are not just pieces of paper. These negotiated compromises, and the robust verification regimes that have been built around them, foster confidence and trust in the international system of states, which ultimately provides long-term security to all.

To address these global challenges effectively, we urgently need to strengthen the nexus between science and diplomacy. The importance of science and scientific knowledge in informing diplomatic discussions, and providing apolitical facts for decision-making and negotiations, cannot be overstated. I firmly believe that science diplomacy can foster trust between nations at these times of heightened tension. Finding common ground is difficult, particularly if national positions harden against a background of strategic competition. Science can be an avenue to open up cooperation, reach beyond political differences and help to build trust and understanding. It can serve as an efficient tool for dialogue in times of relative distance or disagreement, and offer platforms for new forms of interaction and resolution on topics that are politically sensitive. Even at the height of the Cold War, adversaries were able to maintain scientific links and even active scientific cooperation.

Science can unite countries to address cross-border challenges such as pandemics, climate change, energy supply and poverty eradication, which are simply out of reach for any single nation to address independently. The 2015 Sustainable Development Goals (SDGs) provide a solid endorsement of global scientific cooperation on issues that are vital for all human beings, irrespective of region, culture or identity. In many areas, no solutions are possible without the contribution of scientists. The COVID-19 pandemic is proof of this.

### THE CTBT AS BRIDGE-BUILDER

The CTBT itself is one of the greatest examples of science diplomacy. A Group of Scientific Experts brought together scientists from different countries to conduct joint research into possible monitoring technologies and data analysis methods for the verification of a test ban. It was the work of these scientists that made the negotiation of the CTBT possible, by proving that a comprehensive, zero-yield nuclear test ban could be verified. It is scientists and technicians who have established the world's only global monitoring system for nuclear tests. The IMS is an impressive feat of science and diplomacy: a technological network located worldwide that can catch signs of nuclear explosions, while also yielding a range of civil and scientific benefits.

There is every reason for science to continue helping to maintain crucial channels of communication in the face of global geo-political tensions. Today's challenges to the non-proliferation regime and the global security environment require continued dialogue, increased cooperation and a genuine restoration of trust. I strongly believe that science and verification regimes can serve to reassure states about the implementation of commitments vis-a-vis nuclear non-proliferation and disarmament.

I'm encouraged by evolving initiatives on dialogue between nuclear weapons states and non-nuclear weapons states on disarmament verification and non-proliferation. Frank and constructive exchanges should be encouraged and continued in order to maintain channels of communication that can foster relationships of respect, empathy and trust. And I profoundly hope that when the States Parties are finally able to gather for the NPT Review Conference, they will re-commit to multilateral, cooperative measures.

It is my goal to ensure that our great scientific endeavour of the CTBT is secured for all time. Eight countries need to complete their ratification procedures before we can say the CTBT and its monitoring system are secure. The situation in the Korean Peninsula offers a potential path to help make this a reality. The CTBTO stands ready to make its assets and expertise available to contribute to denuclearization efforts, should States Signatories call upon us to do so. There are a number of ways we could contribute. Our real value-added would be in test-site closure activities; in helping to verify a nuclear test moratorium; and in securing signature and eventual ratification of the CTBT by North Korea as a confidence and trust-building measure.

The CTBT is and can continue to be a common denominator among states, especially when other agreements are eroding, expiring or even losing relevance. The value and the contributions to international security that the CTBT and its verification regime provide are irrefutable. It is our collective duty to reaffirm our global commitment to the norm of non-testing and the technical treasure that is the CTBT verification regime, in order to shore up this key element of the international security framework. When other elements of this regime are weakened, the CTBT and its verification regime need to be reaffirmed and strengthened, for our own security and the security of our children.

The tragedy of COVID-19 has thrown a stark light on the need for cooperation and preparedness. But to prepare for nuclear weapons to be used is too late. The only option is prevention.



# Contributors

## GRIGORY BERDENNIKOV

Grigory Berdennikov served as Deputy Minister of Foreign Affairs of the Russian Federation from 1992-1993 and from 1999-2001. He was the Permanent Representative of the Russian Federation to the Conference on Disarmament in Geneva from 1993-1998 and headed the Russian delegation at the negotiations on the CTBT. Berdennikov has served in a number of high-level posts in the Ministry of Foreign Affairs, including as director of the Department for Security and Disarmament Affairs and member of the MFA Board (1998-1999), Permanent Representative of the Russian Federation to the International Organizations in Vienna (2001-2007), and as Ambassador at large (2007-2015). From 2001-2015 Berdennikov was the Governor for the Russian Federation on the IAEA Board of Governors.



## SÉRGIO DUARTE

Sérgio de Queiroz Duarte was the UN High Representative for Disarmament Affairs from 2007 to 2012. In 2005, Duarte presided over the Nuclear Non-Proliferation Treaty Review Conference. From 2003 to 2004, he served as Brazil's Roving Ambassador for Disarmament Affairs. Prior to this, from 1999 to 2002, he was the Permanent Representative of Brazil to the UN at Vienna and Chairman of the International Atomic Energy Agency Board of Governors as well as the Representative of Brazil to the CTBTO. Duarte also served as Ambassador to Nicaragua, Canada and China. Earlier in his career, he was a member of the Brazilian delegations in different UN disarmament fora. Duarte is currently President of the Pugwash Conferences on Science and World Affairs.



## ANGELA KANE

Angela Kane, an expert in political relations and negotiations, peace operations and disarmament, is a Senior Fellow at the Vienna Center for Disarmament and Non-Proliferation, and Vice President of the International Institute for Peace in Vienna. She is a Visiting Professor at the Paris School of International Affairs/SciencesPo, and teaches at Tsinghua University/Schwarzman Scholars in Beijing. She chairs the United Nations University Council in Tokyo. She is a member of the CTBTO Group of Eminent Persons and of the Group of Eminent Persons for Substantive Advancement for Nuclear Disarmament (Japan). She is also Co-Chairman of the World Economic Forum Regional Council on the Korean Peninsula, and serves on NGO Boards in Europe, United States, and Asia. Until mid-2015, Ms. Kane served as the United Nations High Representative for Disarmament Affairs, capping a long career at the highest levels of the Organization.



## HELLMUT LAGOS

Hellmut Lagos is a career diplomat from Chile since 1995. He has been Deputy Permanent Representative to the International Organizations in Vienna and Alternate Representative to the Conference on Disarmament in Geneva. He has actively participated in Multilateral Disarmament since 2006. His main areas of expertise are Nuclear Disarmament and Arms Control in Outer Space.

*(Editorial note: The reflections provided by Mr Lagos in Spectrum represent the author's personal opinions and do not necessarily reflect the official position of Chile.)*



#### **PATRICIA LEWIS**

Patricia M. Lewis is the Research Director, International Security at Chatham House in London. Her former posts include: Deputy Director and Scientist-in-Residence at the Center for Nonproliferation Studies at the Monterey Institute; Director of the United Nations Institute for Disarmament Research (UNIDIR); and Director of VERTIC. Lewis served on the 2004-6 WMD Commission, chaired by Dr Hans Blix, the 2010-2011 Advisory Panel on Future Priorities of the OPCW, chaired by Ambassador Rolf Ekeus, and was an Advisor to the 2008-10 International Commission on Nuclear Non-proliferation and Disarmament (ICNND) chaired by Gareth Evans and Yoriko Kawaguchi. She was a Commissioner on the 2014-2016 Global Commission on Internet Governance chaired by Carl Bildt and is on the EEAS Space Advisory Board (SAB) as a Senior Space Advisor to the EU Special Envoy for Space. She holds a BSc (Hons) in physics from Manchester University, a PhD in nuclear physics from Birmingham University and an Honorary Doctor of Laws from the University of Warwick. She is a dual national of the UK and Ireland.



#### **BRUNO TERTRAIS**

Deputy director of the Fondation pour la recherche stratégique (FRS), Bruno Tertrais is an expert in international relations, geopolitics, crisis and conflict issues, transatlantic relations, security in the Middle East and in Asia and nuclear issues. Between 1990 and 1993, he was Director of the Committee on the Civil Dimension of Security of the NATO Parliamentary Assembly; from 1993 till 2001, he was Special Adviser to the Director for Strategic Affairs at the Ministry of Defense and visiting fellow at the Rand Corporation (1995-1996).



#### **SARAH BIDGOOD**

Sarah Bidgood is Director of the Eurasia Nonproliferation Program at the James Martin Center for Nonproliferation Studies. Bidgood's work is focused on US-Russia arms control and non-proliferation cooperation, as well as the international non-proliferation regime more broadly. She also directs CNS' Young Women in Nonproliferation Initiative.



#### **TOGZHAN KASSENOVA**

Dr Togzhan Kassenova, a native of Kazakhstan, is a Washington, DC-based senior fellow at the Center for Policy Research at the State University of New York at Albany. She is also an adjunct faculty at the Elliott School of International Affairs at the George Washington University and a nonresident fellow at the Carnegie Endowment for International Peace.



#### **MAPATHÉ NDIAYE**

Mapathé Ndiaye is a geologist who graduated from the University of Geneva (Switzerland). Ndiaye is presently a Professor in Applied Geology and Applied Geophysics at the University of Thiès (Senegal). Ndiaye is also the station operator and Public Key Infrastructure operator of BBTS (AS097) auxiliary seismic station of the CTBTO's International Monitoring System network.



# Current Treaty Status

(as of 15 June 2020)

|                        |          |
|------------------------|----------|
| MEMBER STATES          | 184      |
| TOTAL RATIFICATIONS    | 168      |
| ANNEX 2 RATIFICATIONS  | 36       |
| LATEST STATE SIGNATORY | TUVALU   |
| LATEST RATIFYING STATE | ZIMBABWE |

*CTBTO Executive Secretary Lassina Zerbo with the Prime Minister of Tuvalu, Enele Sopoaga, at the signing of the Comprehensive Nuclear-Test-Ban Treaty by Tuvalu on 25 September 2018.*

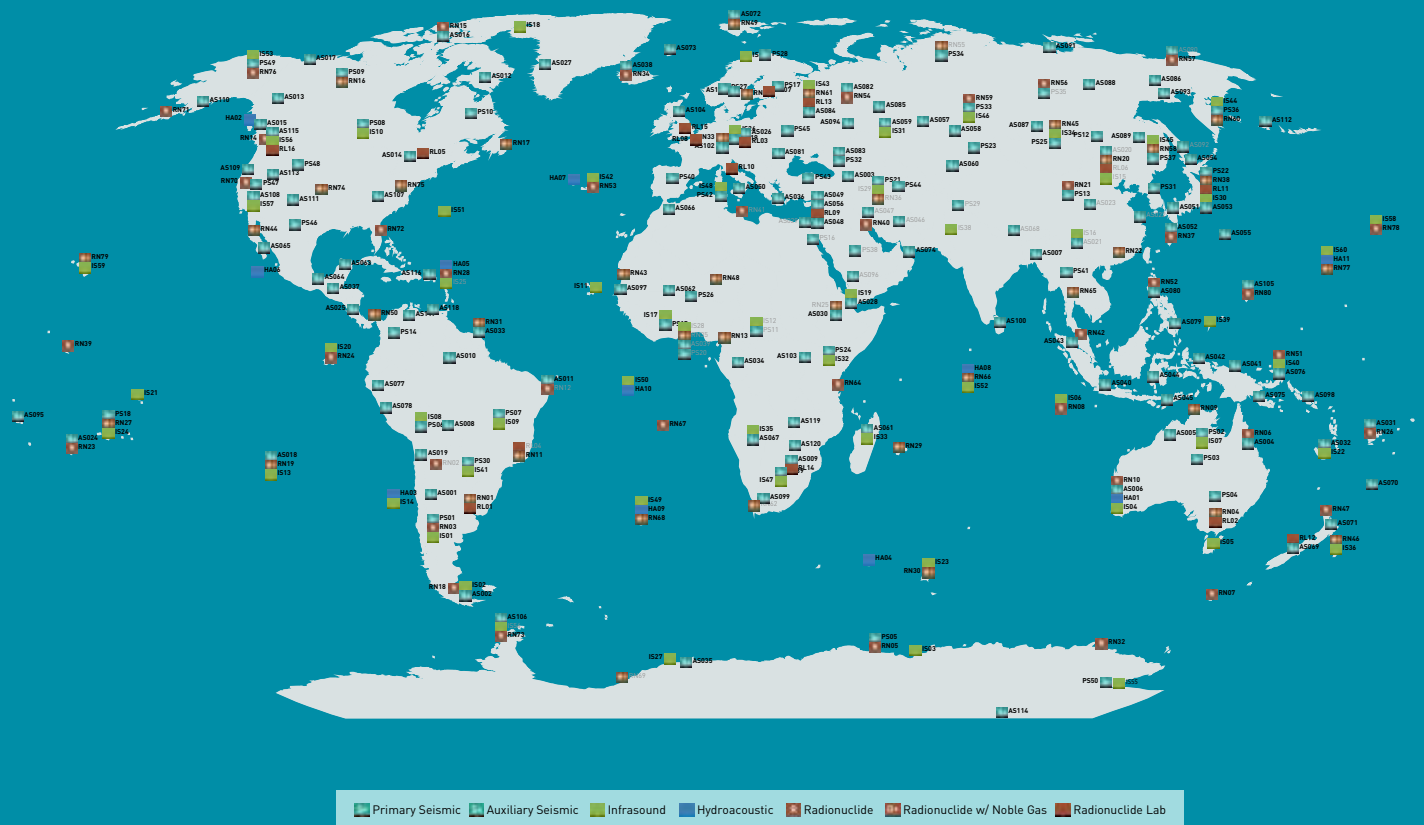




# International Monitoring System Status

(as of 15 June 2020)

|                      |     |
|----------------------|-----|
| CERTIFIED FACILITIES | 300 |
| INSTALLED            | 11  |
| UNDER CONSTRUCTION   | 5   |
| PLANNED              | 21  |



The map shows the 337 facilities around the globe that make up the CTBTO's International Monitoring System.



# NPT and CTBT: a key relationship in tough times

BY CTBTO EDITORIAL TEAM <sup>1</sup>

Reaching consensus within any multilateral institution today can be arduous and elusive as the global community grows more divided over ideology, identity politics and hardening diplomatic positions. Key arms control agreements and non-proliferation measures, such as the Intermediate-Range Nuclear Forces (INF) Treaty and the Joint Comprehensive Plan of Action (JCPOA), have lost support and adherence. The New Strategic Arms Reduction Treaty (New START), the only remaining bilateral nuclear arms control agreement, is due to expire in 2021 and a possible extension remains uncertain.

Protracted and deep-seated grievances fueled by perceptions of missed opportunities, betrayed commitments

and delayed solutions are severely jeopardizing the global nuclear order as we know it, including the long-standing credibility and sustainability of one of the most universal treaties, the Treaty on the Non-Proliferation of Nuclear Weapons (NPT).

Fifty years after the NPT entered into force, many scholars and experts interviewed by CTBTO expressed deep concern over the erosion of the existing arms control and non-proliferation framework, and skepticism over the prospects for a successful 2020 NPT Review Conference when the gathering, postponed because of COVID-19, finally goes ahead. But they also stressed how closely the Comprehensive Nuclear-Test-Ban Treaty (CTBT) is bound up with the NPT, with an end to nuclear

*CTBTO Executive Secretary answers questions at the press briefing in Vienna after the technical briefing to Member States on 3 September 2017 following the DPRK nuclear test earlier that day.*

<sup>1</sup> The overall views and conclusions expressed in this article by the CTBTO Editorial Team do not necessarily represent the views of individual experts quoted.

tests providing a foundation for the whole international disarmament and non-proliferation framework.

#### A DIFFICULT ENVIRONMENT

Sérgio Duarte, president of the 2005 NPT Review Conference and a former UN High Representative for Disarmament Affairs, notes that: **“The erosion [of the global arms control framework] is real and threatens the NPT itself. Important treaties and agreements between the major powers have been abandoned and the multilateral disarmament structure is at peril. There seems to be no will to enter into new arms control negotiations to take account of advances in technology. Over 20 years after its adoption, the CTBT has not entered into force. For nearly three decades now the Conference on Disarmament has been unable to start substantive work. It is imperative that States respect commitments entered into. Leaders – particularly in nuclear weapon states – should realize that their responsibilities toward the community of nations are wider than their parochial interests. Public opinion must participate actively in the common effort to achieve peace and security for all.”**

For Bruno Tertrais, deputy director of the French think-tank Fondation pour la recherche stratégique (FRS), the urgent challenge is “Saving what’s left!”: **“At this point in time, avoiding moving backwards is at least as important as moving forward. It’s a modest agenda but the most urgent one. Saving New START is obviously the priority. I don’t see this as being impossible.”**

Former Russian Ambassador Grigory Berdennikov also voices particular concern about New START: **“If there is no extension, it means that in less than a year from now, for the first time since 1972, mankind will face a vacuum free from any treaty regulation in nuclear arms control and in strategic relations between the two largest nuclear weapon powers.”**

When it comes to the future of the NPT, two trends are particularly worrisome.

First, the 2020 NPT Review Conference comes on the heels of the failed 2015 NPT Conference where no consensus Final Document was delivered. Disillusionment among member-states has endured ever since. And in 2019, NPT States Parties failed to adopt a common set of recommendations for the 2020 Review Conference, making a rapid consensus unlikely this time. Second, as the NPT machinery reaches an institutional stalemate, some member states have begun to search for consensus platforms elsewhere. New initiatives on nuclear non-proliferation and disarmament have flourished to rethink traditional multilateral mechanisms. Most of these initiatives have been conceived outside the NPT Framework and operate as networks and interest groups largely separated from the rest of the international community. The largest of these new nuclear initiatives, the Humanitarian Initiative on Nuclear Weapons, was launched in 2013 by a coalition of non-nuclear weapons states alienated by the lack of progress on disarmament within the NPT negotiations. The initiative ultimately led to the adoption of the Treaty on the Prohibition of Nuclear Weapons (TPNW) which remains legally and institutionally outside the NPT regime.

The most recent US-led Initiative on Creating the Environment for Nuclear Disarmament (CEND), launched in 2018, has been designed as a platform for dialogue among selected and like-minded countries. Similarly, the Swedish Initiative on Disarmament, inaugurated during the NPT Preparatory Committee in 2019, has gathered a group of 14 countries to reinvigorate cooperation over nuclear disarmament while seeking to provide continuity with past efforts.

The challenges to the NPT regime raise important questions on the

**The NPT itself sees the CTBT as a major factor contributing to the non-proliferation regime and a foundation for further measures leading to a world free of nuclear weapons.**

future of multilateral nuclear diplomacy. They also, however, prompt much-needed reflection over how such changes will ultimately affect other multilateral nuclear treaties, and in particular the CTBT.

The upcoming NPT Review Conference: expectations and realism According to Patricia Lewis, who heads the Chatham House International Security programme: **“The most pressing challenge facing the 2020 NPT Review Conference is the reversal of progress in nuclear disarmament. Nuclear weapons are once again on the rise in terms of significance and salience in possessing countries – despite there being no inherent conflict at stake. This is having knock-on effects and we are seeing some countries start to once again consider acquiring the nuclear weapons capabilities that they had eschewed in joining the NPT.**

**“I think supporters of the NPT need to encourage the US and Russia in their efforts to get old-fashioned arms control back on the table – along with robust, workable verification systems. This is really about relationships and seeing the value of framing the role of nuclear weapons in international security in a way that reduces their salience and their inherent risks.”**

Angela Kane, a former UN High Representative for Disarmament Affairs, shares Lewis’ concerns but also highlights how the successful negotiation of the TPNW adds further complexity and deepens the political divide within the NPT constituency of member states.

“Countries that have either signed or ratified the TPNW—or are intending to do so—will not wish to cause a disruption to the NPT review conference, but still it will be something that will be in the back of everyone’s mind, particularly as the numbers are inching upwards towards the 50 ratification bar that basically means that the treaty will come into force. And that may actually happen within the next year.” A Final Document from the Review Conference is important for at least two reasons. Firstly, it indicates the existence of an alignment of global interests and positions regarding nuclear policies and priorities for global peace and security. Secondly, it showcases the willingness of NPT States Parties to accept compromises in order to safeguard international cooperation, and to operate by consensus rather than through unilateral means.

## **The CTBT might be cast as the consensus multilateral nuclear agreement that, through scientific cooperation and data-sharing among all member states around the world, continues to bridge the divide between the haves and the have-nots.**

Of course, a Final Document is achievable only if NPT member states negotiate from the centre and avoid adopting intransigent positions. Given the complexity of achieving a Final Document, Patricia Lewis calls for a different outcome: “For the 2020 NPT Review Conference, I’d like to see a high-level document stressing the vital importance of the NPT on its 50th anniversary – and of course the 75th anniversary of the Hiroshima and Nagasaki nuclear

bombs. Such a document could be agreed at the level of presidents and prime ministers – and it should get to the very core of what is important about the Treaty. An agreed Review Document would be good, but all experts acknowledge that it will be hard to achieve any meaningful agreement on the past five years and on a framework for going forward.” Chilean diplomat Hellmut Lagos also sees value in reaffirming the basic principles of the NPT: “It is vital that all NPT States Parties renovate their previous commitments and give a clear signal of unity, particularly in light of the 50 years of the NPT. This anniversary should serve as a platform to highlight the importance and relevance of the Treaty, but at the same time, a chance to show the international community that there is a willingness to improve its implementation. Initiatives to strengthen the Nuclear Weapons Free Zones and promote the establishment [of a NWFZ] in the Middle East, even if difficult, should not be given up. Another helpful development is to continue to explore common non-proliferation initiatives that don’t replace, but complement, disarmament efforts.”

For Sérgio Duarte: “Given the current state of mistrust and outright hostility between the major powers, the Review Conference should, as a minimum, reaffirm the primacy of international law as the basis for further progress. In this connection, it would be useful for the 2020 Conference to agree that ‘a nuclear war cannot be won and must never be fought’. Over the years, a number of concrete measures to build confidence have been suggested, but opportunities for progress have been lost or neglected. Those suggestions should be revived and given serious consideration.”

### **THE NPT-CTBT NEXUS**

Diplomats and experts agree the relationship between the CTBT and the NPT is vital. In the words of

Bruno Tertrais:

“It strikes me that so few people, in policy circles, realize how much the end of nuclear testing is at the forefront of the whole nuclear disarmament and non-proliferation regime. Many policy-makers and analysts seem to have forgotten how much the ban on testing was a key to the Non-Proliferation Treaty.” The complementarity and interdependence between the two treaties is clear. In its preamble, the NPT recalls the determination of the international community “to seek to achieve the discontinuance of all test explosions of nuclear weapons for all time”. This measure is considered in the Non-Proliferation Treaty as an indispensable condition to halt the nuclear arms race, to prevent countries from acquiring nuclear weapons and to accelerate nuclear disarmament. Thus, one can say that the NPT itself sees the CTBT as a major factor contributing to the non-proliferation regime and a foundation for further measures leading to a world free of nuclear weapons.

In its turn, the CTBT in its preamble recognizes that: “...the cessation of all nuclear weapon test explosions and all other nuclear explosions, by constraining the development and qualitative improvement of nuclear weapons and ending the development of advanced new types of nuclear weapons, constitutes an effective measure of nuclear disarmament and non-proliferation in all its aspects.” Grigory Berdennikov explains: “One can hardly imagine that any non-nuclear weapons state which decides to go nuclear could do it without a nuclear test explosion. But such a test would surely be detected by the International Monitoring System which is an element of the CTBT. This capability was convincingly demonstrated when the DPRK conducted its tests. Thus, the CTBT provides an obstacle to nuclear proliferation, strengthening the non-proliferation regime. “In my opinion, by providing this help



to the non-proliferation regime and by being the indispensable founding stone for further arms control and disarmament measures, the CTBT makes a major contribution to international security. If the CTBT is destroyed it will be a serious blow to the maintenance of international security both directly and indirectly through the weakening of the NPT.”

Over the years the linkage between the two treaties has become even stronger. The promise to negotiate the CTBT and put it into force stood as an essential pre-condition for achieving an indefinite extension of the NPT in May 1995. In 2000, NPT States Parties identified the entry into force of the CTBT as the first of thirteen practical steps to achieve nuclear disarmament. Most specifically, the Final Document reaffirms: “...the importance and urgency of signatures and ratifications, without delay and without conditions and in accordance with constitutional processes, to achieve the early entry into force of the Comprehensive Nuclear-Test-Ban Treaty”.

Finally, the Action Plan on disarmament adopted by the NPT member states at the conclusion of the 2010 NPT Review Conference identified five actions that the international community was required to undertake to accelerate the entry into force of the CTBT as a “core element of the international nuclear disarmament and non-proliferation regime”.

### LOOKING BACK TO MOVE FORWARD

As the margins of political consensus among NPT member states shrink and multilateral ambitions recede, the need to identify policy areas where pragmatic consensus can be forged becomes essential and urgent. The desire to find goals that serve as common denominators was visible at the 2019 NPT Preparatory Committee, where more than 75 member states in their opening statements mentioned the CTBT as a bridge-building and consensus treaty. A flurry of working

**The desire to find goals that serve as common denominators was visible at the 2019 NPT Preparatory Committee, where more than 75 member states in their opening statements mentioned the CTBT as a bridge-building and consensus treaty.**

papers then followed, submitted by widely diverse coalitions of countries, to reiterate the indispensable role of CTBT in nuclear nonproliferation and in the disarmament process. Amid geopolitical uncertainties, these diplomatic statements recognized CTBT as the treaty that could help bridge the gap between nuclear weapons states and non-nuclear weapons states.

Innovative frameworks were also introduced at the NPT PrepCom in support of the CTBT. In its national statement, and while introducing its government-led initiative on support to the NPT 2020, Sweden cast CTBT as a transparency enhancement mechanism in arms control agreements. This is important because it recognizes both the confidence-building role that CTBT can play in a widely diverging international community, and the role it plays through its verification system as a credible enforcer of rules and principles widely shared by that international community.

Finally, a few countries began to discuss CTBT in the context of broader risk-reduction strategies. Discussions on what constitute mutually agreed steps that might reduce the risks of miscalculation or military confrontations are now emerging in various academic and policy settings. CTBT has been listed alongside de-alerting and other instruments as an indispensable instrument to elevate global strategic transparency and reduce

misperceptions among nuclear weapons states and nuclear aspirant countries amid geopolitical tensions.

### REVIVING THE CENTRALITY OF THE CTBT AT THE NPT REVCON

The discussion that took place during the NPT PrepCom in 2019 might serve as a conduit to formulate a few expectations on how the CTBT will be framed during the upcoming Review Conference.

Here are some preliminary observations:

1. The CTBT might be cast as the consensus multilateral nuclear agreement that, through scientific cooperation and data-sharing among all member states around the world, continues to bridge the divide between the haves and the have-nots.
2. The CTBT as the emblem of global science diplomacy in action. Great enthusiasm today surrounds the role that scientists can play in finding common ground in highly politicized debates over global challenges, ranging from nuclear proliferation to climate change and beyond. The CTBTO, with its extraordinary pool of scientists and the deployment of four technologies, has in recent months been celebrated as the perfect example of science diplomacy in action.
3. The CTBT as a confidence building mechanism in talks on regional and global crises. Tensions in nuclear arms negotiations, including recent efforts towards denuclearization of the Korean Peninsula, have underscored the need for substantive confidence-building measures that could highlight the good faith of the parties to resolve crises peacefully. As the international community today confronts these nuclear crises and tries to resolve them, an important political opening might emerge for the CTBT to play a critical role in de-escalating tensions among parties.

*The Comprehensive Nuclear-Test-Ban-Treaty at the United Nations in New York. The Treaty was photographed on the occasion of the signature ceremony on 25 September 2018 when Tuvalu signed the CTBT.*

# The CTBT: rebuilding trust in the multilateral nuclear regime

BY CTBTO EDITORIAL TEAM <sup>1</sup>

The year 2020 marks the 75th anniversary of the bombings of Hiroshima and Nagasaki, and the 50th anniversary of the Treaty on the Non-Proliferation of Nuclear Weapons (NPT). Yet since the last NPT Review Conference in 2015, the multilateral non-proliferation and disarmament framework has suffered a series of shocks and is facing serious challenges to its credibility and integrity.

The international community is increasingly split on the importance and value of a norms-based order rooted in negotiated treaties and agreements. Trust in the disarmament and non-proliferation regime is at a low point, with analysts pointing to a lack of implementation of past decisions and commitments as a factor contributing to a credibility deficit in the multilateral process. Some observers say we are witnessing an erosion or even destruction of treaty-based arms control.

<sup>1</sup> The overall views and conclusions expressed in this article by the CTBTO Editorial Team do not necessarily represent the views of individual experts quoted.

The key agreements and treaties, which resulted from careful and expert technical negotiations, are the foundations of the multilateral non-proliferation regime that consolidates global norms of behaviour. They are bulwarks against the proliferation of nuclear weapons, and enhance confidence and trust in the multipolar system of states.

In the words of former Russian Ambassador Grigory Berdennikov: “The whole history of international relations is a witness to the fact that there is no alternative to treaty-based relations among nations, and arms control is no exception.”

One of these prime initiatives is the Comprehensive Nuclear-Test-Ban Treaty (CTBT). Ahead of the postponed 2020 NPT Review Conference, experts interviewed for Spectrum agree that the CTBT remains a significant mechanism that can continue to build confidence and trust in the nuclear non-proliferation framework through the proven value of its robust global verification regime.

Former UN High Representative for Disarmament Affairs Angela Kane sees a shift away from multilateralism within the international system: “What is missing these days—and what I have seen over the course of my life and my career – was that there was always a strong support of multilateralism and global action. There are countries that have now stepped back from such a global view. When you look at how treaties that have been agreed to are being signed and ratified, the pace is very slow. That was not the case in earlier years, earlier decades. I find it regrettable that this worldwide view that we are all in this together has been eroded by saying ‘My country comes first, I do not wish to be in a community of states which binds me by giving me certain restrictions on how I wish to act.’”

Sérgio Duarte, president of the 2005 NPT Review Conference and

a former UN High Representative for Disarmament Affairs, also stresses the importance of reviving a multilateral approach: “Over the past 50 years the NPT has been largely successful in containing the number of States that possess nuclear means of destruction. Today, however, the credibility of the regime is shaken as a result of the lack of progress in nuclear disarmament and the apparent willingness of the nuclear-weapon states to retain their arsenals in perpetuity. The most pressing challenge is to restore confidence in the multilateral process.

#### VERIFIABILITY BUILDS TRUST: THE CTBT AS CONFIDENCE-BUILDER

In arms control and non-proliferation agreements, verifiability builds trust between parties – particularly between adversaries. A robust verification regime is an essential element of a credible arms control agreement, providing reassurance that states are implementing their commitments. This is particularly important during times of heightened geo-political tensions and in an era of eroding trust between states.

Verification regimes proved their worth during the height of the bipolar Cold War between two hostile adversaries. We are now operating in a complex multipolar system of states characterized by high levels of mistrust and strategic competition, where the traditional arms control architecture is crumbling and treaty-based norms are being questioned. This is a world which requires solid elements of verifiable reassurance.

The CTBT has a verification regime that is second to none, monitoring the globe continuously for any sign of a nuclear test. In the current, hostile geopolitical environment, this robust and proven verification regime provides impartial confidence to member states, and to the international community at large. The reassurance that the CTBT fosters has grown as its verification regime has

**In the current, hostile geopolitical environment, this robust and proven verification regime provides impartial confidence to member states, and to the international community at large.**

been built up following the establishment of the CTBTO in 1997. Today, some 300 International Monitoring System (IMS) installations around the globe are sending data to the International Data Centre (IDC) in Vienna, from where the information is shared with member states. The system has accurately detected and characterized all six nuclear tests by the DPRK.

Patricia Lewis, Director of the International Security Programme at Chatham House in London, says: “The CTBT is one of the most important treaties in the field of nuclear disarmament and non-proliferation. The fact that, 24 years after its negotiation, it has not yet entered into force is a peculiar situation and a source of shame for the international community.

“The IMS, which is established to verify the Treaty once it comes into force, has already proven itself to be an important facility for many countries for earthquake prediction and tsunami warnings. I think that the IMS is a valuable resource for all – one that goes way beyond the CTBT verification task. The IMS has surpassed expectations in its ability to create a global network of detectors that monitor the land, sea and air for nuclear explosions and has contributed to international security already by detecting and analysing the nuclear tests conducted by North Korea.”

Indeed, the CTBT can serve as a confidence-building measure to support the denuclearization of the Korean Peninsula. Executive Secretary Lassina Zerbo has made clear that the CTBTO is ready to make its assets and expertise available to contribute to denuclearization efforts, if member states ask it to do so.

Within the NPT review process, the CTBT and the work of the CTBTO should be a unifying issue, one common denominator that states can agree support for. At the 2019 NPT Preparatory Committee for the 2020 Review Conference, the vast majority of NPT States Parties expressed their support for the CTBT, whether through national statements or association with regional statements, or through the submission of and association with official working papers. More than 70 states made direct references to the CTBT in their national statements, most of which expressly called for the Treaty's entry into force and universalization. Several working papers, with the endorsement of more than 150 countries all together, were submitted expressing support for the CTBT. Perhaps states can be unified in promoting one joint working paper or statement in support of the CTBT, drawing together all such statements of support.

Angela Kane highlights the potential role of the CTBT in bringing together diverging views on pathways to disarmament: **"One of the ways it [the divide] can be bridged is by looking at not only the nuclear weapons, but by looking at supportive measures. The supportive measure foremost in my mind is the CTBT."**

Kane says she is 'very encouraged' by a proposal last November by Kazakhstan's First President Nursultan Nazarbayev to establish a Global Alliance of Leaders for a Nuclear-Free World to advance the nuclear non-proliferation and disarmament agenda. Calling this an 'excellent initiative', she said it

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could promote further signatures and ratifications of the CTBT, particularly by the eight remaining Annex 2 countries whose ratification is required for it to come into force.

Chilean diplomat Hellmut Lagos argues that cross-regional, issue-based groupings can be key vehicles in promoting the CTBT's entry into force: **"A good example of this is the Non Proliferation and Disarmament Initiative (NPDI) that has published op-eds including this issue. These groups can also organize joint demarches to the capitals of Annex 2 states and work together for the Article XIV Conferences on Facilitating Entry into Force of the CTBT."**

#### **THE CTBT: EMBODYING SCIENCE DIPLOMACY**

The CTBT is also one of the greatest examples of the nexus between science and diplomacy. It was the work of scientists that made the negotiation of the CTBT possible, by proving that a comprehensive, zero-yield nuclear test ban could be verified. With ever escalating tensions, science helps us to identify concrete steps that can bring opposing views together. The language of science is universal and can reach beyond political differences and help build trust and understanding. Science is borderless, able to cut across countries, communities

and individuals that are otherwise separated by conflict or mistrust.

As a technical international organization, the work of the CTBTO provides reliable information to member states in support of international security. The IMS is a true feat of science and diplomacy: a technological network located worldwide that provides impartial information to member states and scientists to catch signs of nuclear explosions, and which can also yield a range of civil and scientific benefits. Through formal tsunami warning agreements, IMS data are being made available to support national authorities in 16 countries to issue fast, accurate public tsunami alerts. IMS data can help to track radionuclides after civil nuclear accidents, to monitor climate, and to support a wide range of other scientific research. Patricia Lewis says science diplomacy is "one of the best initiatives to come out of the CTBTO's work in recent years": **"The role of scientists is vital in finding the solutions to our problems. Not all of those solutions are about science and technology but, for diplomats to find new avenues, they have to understand the science behind the issues and, for scientists to contribute, they have to understand diplomacy. I have seen many occasions when both communities work effectively together for the good of humanity and the environment. I am particularly delighted with the young scientists that I have met at CTBTO Science and Technology conferences from all over the world. They are the future, and that gives me hope."**

In addition to its biennial Science and Technology conferences, the CTBTO has launched a series of Science Diplomacy Symposia. The third of these, originally scheduled for March 2020, now looks set to go ahead in November. In addition to examining the lessons that can be learned from the CTBT, the Symposia aim to stimulate creative thinking about possible political, legal and





Analysts viewing data at the CTBTO/PTS Operations Centre (COPC) which is an integrated facility with state-of-the-art technology equipment for monitoring and supporting IMS, IDC and OSI operations of the verification regime.

## Within the NPT review process, the CTBT and the work of the CTBTO should be a unifying issue, one common denominator that states can agree support for.

diplomatic solutions among diplomats, practitioners, policymakers, academics and the next generation to the challenges facing the Treaty. Experts interviewed here also highlighted the important role that education can play, both in helping to build empathy and trust in the nuclear non-proliferation regime, and in promoting the CTBT. Bruno Tertrais, deputy director of the French think-tank Fondation pour la recherche stratégique (FRS), says: “I have a very modest view of what think-tankers can do in these matters. But I do think that we can have a role in ensuring that the best

arguments in favour of the Treaty and the organization are made by non-governmental analysts and are heard by as many constituencies as possible in as many countries as possible.”

Hellmut Lagos also emphasizes that education is vital in promoting the entry into force of the CTBT and attaining the ratification of the final eight Annex 2 states: “When we talk about the catastrophic humanitarian consequences of any use of nuclear weapons, we should also consider the use through nuclear weapon testing. There is not enough dissemination of this issue, which would change the perceptions and motivate the citizens of those states. Only then it will become an important political priority for governments.” The restoration of credibility in the nuclear non-proliferation and arms control regime is a long-term goal that will require steady and consistent layering of commitment by the international community – nuclear-weapon states and non-nuclear-weapon states

alike. The CTBT is a mechanism that not only fosters confidence and trust in the nuclear non-proliferation framework, with the proven value of its robust global verification regime, but can actually help restore trust in the broader nuclear policy landscape.

When states parties gather for the delayed 2020 NPT Review Conference, the CTBT can and should be one issue on which they can seek some agreement as a basis for further progress. Positive action on the CTBT would provide the progress that we need to see in the NPT review cycle at this time of disillusionment, and build confidence and trust in the broader non-proliferation regime.

Given that CTBT verification is up and running with its state-of-the-art IMS, supporting a de-facto global moratorium on nuclear tests, entry into force is the most effective disarmament measure within the grasp of the international community.

## Group of Eminent Persons (GEM) at the CTBT: Science and Technology Conference 2019 (SnT2019)



GEM members drafting the declaration at the Hofburg Palace in Vienna.



GEM members Grigory Berdennikov (L), Ho-Jin Lee (C-R), Sérgio de Queiroz Duarte (R) are joined by Ambassador Marcel Fortuna Biato (C-L).



GEM members Nobuyasu Abe (L), Kim Won-soo (C) and Ahmet Üzümcü (R).



GEM members Angela Kane and Abel Adalakun Ayoko.



GEM members Ho-Jin Lee and Wolfgang Hoffmann.



GEM members Angela Kane and Abel Ayoko speaking on a panel session along with Anna Maria Cetto and John Bernhard on 25 June 2019.



GEM member Lord Browne of Ladyton giving a keynote address on 25 June 2019.



# GEM Declaration

JUNE 2019

The GEM participating in this Conference collectively:

Members of the CTBTO's Group of Eminent Persons (GEM) met in June 2019 on the sidelines of the Science and Technology 2019 conference at Vienna's Hofburg Palace.

They adopted this Declaration, reaffirming their commitment to promoting the Comprehensive Nuclear-Test-Ban Treaty and calling on all States for their support in advancing its entry into force, notably during the 10th NPT Review Conference.

1. Express their unwavering commitment to promoting the CTBT, recognizing the importance of the treaty in the global non-proliferation and disarmament architecture;
2. Recognize that the CTBT constitutes the most effective and practical non-proliferation and disarmament measure within grasp of the international community;
3. Call upon all States to continue their support in advancing the entry into force of the Treaty as the most practical step towards nuclear disarmament, notably during the upcoming 2020 NPT Review Conference;
4. Recall United Nations Security Council Resolution 2310 (2016) which urges all States that have either not signed or not ratified the Treaty, particularly the eight remaining Annex 2 States, to do so without further delay and encourages all States Signatories to promote the universality and entry into force of the Treaty;
5. Commit to place the CTBT on the agenda of the world's most important events and to conduct tailored outreach work in line with the 2019-2020 plan of action adopted at the conference;
6. Urge the international community to make full use of the CTBT verification expertise and knowledge in the process of denuclearization of the Korean Peninsula;
7. Emphasize the role of civil society, academia and youth to develop tailored strategies for increased regional support for the CTBT and its universalization;
8. Stress the important role that GEM and CYG can play in promoting the CTBT;
9. Recognize the overarching objective of achieving a world free of nuclear weapons and highlight the importance of first achieving the key precondition for this - a world without nuclear testing;
10. Recognize the contribution of the CTBT and its verification regime to human health and protection of the environment by enforcing a comprehensive ban on nuclear explosions, thereby contributing substantively to the advancement of the 2030 Sustainable Development Goals;
11. Encourage further promotion of the science diplomacy nexus through concrete CTBTO capacity building projects and further research and coordination with relevant peace and development agencies;
12. Expressed their appreciation for the CTBTO well-established series of SnT conferences that provides a forum for scientists, industry leaders and policy-makers from around the world to exchange knowledge and share advances in monitoring and verification technologies of relevance to the Comprehensive Nuclear-Test-Ban Treaty. These conferences facilitate better connection between policy and science and the articulation of new ideas and technologies that are essential for promoting global peace and security. In this context call upon States to support through voluntary contributions capacity building projects focusing on the next generation of policy and scientific leaders.

# The CTBT and the 2020 NPT Review Cycle: challenges, risks, and opportunities

BY SARAH BIDGOOD



*Executive Secretary Lassina Zerbo addresses the 2015 NPT Review Conference on 29 April 2015  
Photo Credit: UN Photo/Eskinder Debebe*

When the Comprehensive Nuclear-Test-Ban Treaty (CTBT) was concluded in 1996, US President Bill Clinton called it the “longest sought, hardest fought prize in arms control history.” This characterization proved both more prescient—and more premature—than he could have imagined at the time. While 168 countries have ratified the CTBT as of February 2020, eight of the 44 states that must do so in order for it to enter into force have not. This situation has remained unchanged since 2012, when Indonesia became the 36th Annex 2 State to become a party to the Treaty.

In spite of these circumstances, the CTBT has played a crucial role in the development of a robust global norm against nuclear testing in the nearly 24 years since its conclusion. One unintended consequence of this outcome, however, is the current lack of urgency surrounding the Treaty’s

entry into force. In part because a return to widespread nuclear testing has seemed so unlikely in recent years, efforts to persuade the eight remaining Annex 2 states to pursue ratification have been unsuccessful. As a result, the CTBT is neither legally binding or enforceable today, a situation that places the non-proliferation community at a significant disadvantage.

This is especially the case today, given that the international security situation is both more dangerous than it was a year ago and rapidly deteriorating. The traditional arms control architecture is eroding, and the norm against nuclear testing could potentially follow suit. Faced with the challenges posed by North Korea’s nuclear weapons program, the unraveling of the Joint Comprehensive Plan of Action (JCPOA), and a return to arms racing, practitioners

and experts should consider how the CTBT can help address the world’s most pressing nuclear threats. Reaffirming the Treaty’s contributions to the non-proliferation regime would be an important first step toward reinvigorating support for its entry into force today.

The upcoming 2020 Review Conference of Treaty on the Non-Proliferation of Nuclear Weapons (NPT) could constitute a target of opportunity for this endeavor. Here, States Parties will have the chance to underscore the CTBT’s relevance to new and long-standing challenges while highlighting its mutually reinforcing relationship with the NPT. They could do so in an especially compelling way when it comes to addressing North Korea’s nuclear weapons program. If North Korea signed and ratified the CTBT, this would provide a legally binding assurance that Kim Jong Un planned



to uphold the nuclear test moratorium he unilaterally declared in April 2018. Proposals to this effect were included in the 2018 NPT Chair's Factual Summary and the 2019 Chair's working paper, both of which urged the DPRK to sign and ratify the CTBT. Delegates should revisit this language as they look for practical recommendations that could attract widespread support when they meet in New York later this year.

The documents issued by the Preparatory Committee (PrepCom) chairs in 2018 and 2019 also encourage continued efforts toward the establishment of a the Weapons of Mass Destruction-Free Zone (WMDFZ) in the Middle East, and the CTBT has a role to play here, too. Were states in the region to sign and ratify the CTBT, it would help to reduce the trust deficit between relevant actors—especially against the backdrop of an unravelling JCPOA. What is more, since nuclear testing will almost certainly be prohibited under any treaty establishing a WMDFZ in the Middle East, joining the CTBT would help to forge agreement on this issue among diverse parties, which could make future negotiations easier. States in the region could start by installing and certifying their IMS stations, which would constitute a powerful transparency and confidence-building measure without requiring an immediate commitment to ratify. The moment is right to explore how these concrete steps and others could help to operationalize the political declaration adopted at the inaugural session of the UN conference on the establishment of a WMD Free Zone in the Middle East in November 2019. In answering its call for “initiatives, resolutions, decisions and recommendations” relevant to these efforts, delegations at the Review Conference should highlight where the CTBT, as both a non-proliferation and arms control treaty, can contribute to this process.

In addition to its relevance to regional challenges, the CTBT is of central importance to the implementation of

Article VI of the NPT, which will no doubt be a focal point at the Review Conference, as well. While its role in limiting vertical proliferation is fairly obvious, the CTBT can also help to lower the risk of nuclear use by reducing uncertainty and preventing NPT States Parties from engaging in certain provocative behaviours. These include a return to widespread nuclear testing, which would worsen an already dire international security situation and make deliberate or accidental nuclear exchange more likely. An in-force CTBT would greatly increase the political consequences of resuming testing while preventing nuclear weapon States from developing new tactical nuclear weapons that would lower the threshold for nuclear use. Revisiting the language from Action 5d of the 2010 Action Plan could provide a useful starting point from which to capture how the CTBT can help reduce nuclear risk. It calls upon the nuclear weapon States to “discuss policies that could prevent the use of nuclear weapons and eventually lead to their elimination, lessen the danger of nuclear war and contribute to the non-proliferation and disarmament of nuclear weapons.” Identifying CTBT ratification as one of these policies at the 2020 Review Conference would highlight this Treaty's relevance to what is arguably one of the most significant dangers the international community faces today. It would also serve to underscore the continued validity of commitments agreed to in the 2010 Review Conference final document, which, as the most recent outcome document to have been adopted by consensus, is especially significant.

These proposals are likely to be dismissed by States Parties that oppose the CTBT, and there is some risk that raising the profile of Treaty too visibly during the current review cycle may have the opposite of its intended effect. If the Conference is unable to agree on the CTBT's relevance to today's most significant nuclear threats, this outcome could

## **The CTBT's applicability to the full roster of non-proliferation challenges—both existing and emerging—is part of what makes it so central to efforts to overcome them.**

serve to diminish support for the Treaty's entry into force instead of increasing it. By the same token, however, States Parties are mandated under the Strengthened Review process to assess past implementation of the NPT and to consider ways to achieve further progress in the future. They cannot carry out this obligation in good faith without acknowledging the importance of the CTBT. A commitment to “achieve the discontinuance of all test explosions of nuclear weapons for all time” is enshrined in preamble of the NPT itself. Reaffirming this objective is only appropriate upon the 50th anniversary of the NPT's entry into force, and doing so would go a long way toward shoring up the credibility of the nonproliferation regime at a time when it desperately needs it.

Whether in the context of addressing North Korea's nuclear weapons, establishing a WMDFZ in the Middle East, or arms control and nuclear risk reduction, the CTBT and its global monitoring system provide opportunities to build trust and confidence, reduce uncertainty, and strengthen norms and values shared by diverse parties. The CTBT's applicability to the full roster of non-proliferation challenges—both existing and emerging—is part of what makes it so central to efforts to overcome them. With this in mind, States Parties, experts, and practitioners should consider how best to highlight the Treaty's salience during this final act of the 2020 NPT Review Cycle without increasing its vulnerability. If successful, their efforts will help ensure that the international community can take full advantage of this underutilized Treaty for which it fought so hard.



*CTBTO GEM members and CTBTO Youth Group members exchanging views at the inter-generational dialogue sessions at the 2019 CTBTO Science and Technology (SnT) Conference.*

# Towards a real nuclear inter-generational dialogue: the experience of CTBTO

BY CTBTO EDITORIAL TEAM

The call for a more inclusive dialogue with younger generations on issues of global relevance is growing more pressing by the day, within the United Nations and beyond.

As the world population ages and welfare costs increase, a solid inter-generational social contract based on principles such as fairness, justice and communitarianism is seen as indispensable for societies to remain peaceful. The world's media have been riveted by youth activism on issues related to climate change, environmental protection and sustainability. These youth-led movements have risen to global prominence because they have been able to cast the relations among generations as a matter of justice broadly conceived. In this

new framework, the social contract between generations includes burden-sharing over rising costs related to welfare for the aging population, but also a more responsible approach to the environment and development. Genuine inter-generational dialogue amid geopolitical uncertainties and global pains is also vital to establish and nurture a globally minded class of future leaders attuned to working collegially for the greater good.

Inspired by the green movements, inter-generational dialogues are emerging in other domains including human rights and nuclear disarmament. In a recent report, UN Secretary General António Guterres remarks that young people:

**“proved their power time and again in support of the cause of disarmament. Young campaigners have worked at the forefront of successful international campaigns to ban landmines, cluster munitions and nuclear weapons.”**

Against this backdrop, the CTBTO is actively supporting youth involvement through its CTBTO Youth Group (CYG), and its experience of fostering constructive relationships across the generational divide is yielding valuable lessons.

## YOUTH FOR DISARMAMENT

According to the UN's 2019 World Population Prospects report, there are about 1.2 billion youth aged 15 to 24 years in the world, or 16 per

## AGE BREAKDOWN

| AGE RANGE    | NO. OF MEMBERS |               |
|--------------|----------------|---------------|
| <18          | 7              | 0.8%          |
| 18 – 22      | 149            | 17.7 %        |
| 23 – 26      | 276            | 32.7%         |
| 27 – 30      | 221            | 26.2%         |
| 31 – 33      | 82             | 9.7%          |
| 34–35        | 45             | 5.3%          |
| 35 <         | 50             | 5.9%          |
| Unknown      | 13             | 1.5%          |
| <b>Total</b> | <b>843</b>     | <b>100.0%</b> |

## REGIONAL DISTRIBUTION

| REGION  | NO. OF MEMBERS |               |
|---|----------------|---------------|
| Africa  | 117            | 13.9%         |
| Eastern Europe                                | 115            | 13.6%         |
| Latin America and the Caribbean               | 51             | 6.0%          |
| Middle East and South Asia                    | 183            | 21.7%         |
| North America, Western Europe                 | 296            | 35.1%         |
| South East Asia, the Pacific and the Far East | 81             | 9.6%          |
| <b>Total</b>                                  | <b>843</b>     | <b>100.0%</b> |

## AFFILIATION

| AFFILIATION                      | NO. OF MEMBERS |               |
|----------------------------------|----------------|---------------|
| Student                          | 442            | 52.4%         |
| Station Operator                 | 2              | 0.2%          |
| Researcher                       | 108            | 12.8%         |
| Professor                        | 12             | 1.4%          |
| Permanent Mission                | 6              | 0.7%          |
| Other Ministry/Government Agency | 46             | 5.5%          |
| Other                            | 52             | 6.2%          |
| Non Governmental Organization    | 47             | 5.6%          |
| National Data Centre             | 24             | 2.8%          |
| Ministry of Foreign Affairs      | 4              | 0.5%          |
| International Organization       | 31             | 3.7%          |
| Unknown                          | 69             | 8.2%          |
| <b>Total</b>                     | <b>843</b>     | <b>100.0%</b> |

cent of the global population. In 2019, Central and Southern Asia were home to the largest number of youth (361 million), followed by Eastern and South-Eastern Asia (307 million) and sub-Saharan Africa (211 million). Nearly half of the world's young live in Sub-Saharan Africa.

In the past two years, the United Nations has accelerated its efforts to forge a constructive policy dialogue with youth around the world. The interest of the international community in engaging young people in the most pressing issues of our times has resulted in the adoption of important policy and legislative instruments.

For example, in his Agenda for Disarmament: Securing Our Common Future, Secretary General Gutierrez has asked the international community to undertake greater efforts to empower young people and establish inclusive consultative mechanisms with them. In response to that call, late last year at its 74th session the First Committee of the United Nations General Assembly adopted – for the first time since its establishment – a resolution on Youth, Disarmament and Non-Proliferation.

The resolution recognizes the critical role of young people as agents for social change, and encourages Member States, the United Nations, relevant specialized agencies and regional and subregional organizations: **“to promote the meaningful and inclusive participation of young people in discussions in the field of disarmament and non-proliferation, including through dialogue platforms, mentoring, internships, fellowships, scholarships, model events and youth group activities”.**

## CTBTO YOUTH GROUP: NUMBERS AND IMPACT

The CYG, established in 2016 under the leadership of Executive Secretary Lassina Zerbo, today stands as one of the largest youth initiatives on nuclear disarmament and non-proliferation.



The scope of the initiative is twofold: to preserve the extraordinary legacy and historical achievements of the anti-nuclear-test movement by educating young people on the importance of the CTBT and the urgency of banning nuclear test explosions once and for all; and to work alongside the new generation to find creative ways to maintain and expand support to the CTBTO from communities and societies, member states and organizations around the world.

Today the CTBTO Youth Group counts roughly 900 members from 101 countries with an almost equal representation of women (48.3%), and men (51.7%). The data provided below offers a more comprehensive picture of our youth members.

At the same time, the CTBTO has established an internal Task Force mandated to coordinate the CYG initiative, identify opportunities for youth engagement, develop and conduct capacity building training across regions and design social media platforms to encourage youth to share knowledge and experiences related to their work in the promotion of the CTBT.

The initiative has certainly allowed the CTBTO to benefit from the incredible talent and creativity of young professionals from around the world. From science to policy and the arts, young people engaged with the CTBTO have devised innovative ways to reach young people around the world, integrate the Treaty into educational curricula and bring CTBTO scientific knowledge to museums and art forums. Similarly, the initiative has helped young professionals strengthen their understanding and knowledge of issues related to nuclear disarmament and non-proliferation. Over 25 regional and national workshops and outreach educational activities have been organized in the past three years with the participation of over 300 youth members.

### A successful inter-generational dialogue develops over time.

In addition, the CTBTO Youth Group has facilitated the creation of a global network of like-minded young professionals interested in working together to achieve a world free of nuclear weapons. The CTBTO has made concerted efforts to feature youth members in high-level meetings, including CTBTO side-events at

the Nuclear Non-Proliferation Treaty's Preparatory Committee in 2017, 2018 and 2019. CYG members have also been invited to address CTBTO Ministerial Meetings in 2017 and 2019.

### CTBTO'S INTER-GENERATIONAL DIALOGUE

To capitalize further on the success of the CYG initiative, the CTBTO has been working to convene a series of Inter-Generational Dialogues between CYG members and established diplomats, scientists and policy makers in the field of nuclear non-proliferation, sustainable development and disarmament. Two of the most successful inter-generational dialogues convened by the CTBTO involved CYG members and selected representatives from the CTBTO Group of Eminent Persons (GEM), held to mark the International Day against Nuclear Tests in August 2018, and during the CTBTO Science and Technology Conference in June 2019.

In 2018, under the banner of the CTBTO GEM-Youth International Conference "Remembering the past, looking to the future", CYG members and GEM participants examined the conditions that allowed for the successful negotiations of the Comprehensive Nuclear-Test-Ban Treaty and discussed how the Treaty

*CTBTO Youth Group members  
at 2019 SnT Conference in Vienna*







*CTBTO Youth Group members exchange views with CTBTO GEM members at the inter-generational dialogue sessions at the 2019 SnT Conference held at the Hofburg Palace in Vienna.*

continues to be relevant today. In 2019 the two groups focused on how the Sustainable Development Goals interplay with the mandate of the CTBT to achieve a world free of nuclear weapons. The two groups also exchanged views on how educational institutions today should offer a curriculum that better promotes global citizenship and universal values. The dialogues between the two groups were held in closed-door sessions and were moderated by facilitators specialized in inter-cultural mediation. The discussions were structured in segments, each revolving around the examination of a specific policy question related to the mandate and current work of the CTBTO.

Both dialogues ended in success as participants worked collaboratively towards the generation of new project ideas. As inter-generational dialogues proliferate around the world, the experience of the CTBTO Youth Group – GEM dialogue revealed important lessons learned:

#### **A Make it timely and relevant**

Inter-generational dialogues work best if they are convened around concrete strategic questions that can be best addressed through an inclusive decision-making approach.

Before convening the dialogue, participants need to understand in what way this dialogue serves a higher purpose for the organization.

#### **B A learning experience for everyone**

Former diplomats and professionals well established in their field bring to the table a unique historical perspective that should not be lost in the dialogue. In the case of the Comprehensive Nuclear-Test-Ban Treaty, many of the GEM members served as negotiators to the Treaty itself. Personal accounts of how the diplomatic negotiations unfolded made for compelling and inspiring stories encouraging much deeper learning for all participants.

In addition, and even more importantly, a historical perspective allows participants, especially the youngest ones, to recognize that all generations have faced troubling challenges and encountered both defeats and victories along the way. Young people often erroneously believe that the historical moment in which they are coming of age is bleaker and more conflictual than previous ones. It is vital therefore to restore a historical perspective to today's challenges and to make young people understand that

these challenges originated long ago. Similarly, young people offer insights into modern thinking that former diplomats might not be familiar with. It is therefore important to recognize that each dialogue is informed by a specific historical context that skews interpretation of facts and perceptions.

#### **c Sustain the dialogue**

A successful inter-generational dialogue develops over time. Generally, when two groups come together for the first time, the dialogue inevitably stays on a superficial level. It is only when the groups meet for the second and third time that a bond forms among their members and deep learning begins.

### **CONCLUSIONS**

The CTBTO is deeply committed to continue engaging with young people to promote and advance the vision of a world free of nuclear weapons. We are also strong supporters of forging a strong bond among generations committed to such a goal. We have planned new inter-generational dialogues around the world, and we are determined to continue to sustain such efforts in the future.

# 75 years after Trinity: A legacy of harm and hope

BY CTBTO EDITORIAL TEAM

*The first nuclear explosion: 'Trinity',  
16 July 1945, Alamogordo, New  
Mexico, United States.*

100 METERS

**"It is high time to bring the Comprehensive Nuclear-Test-Ban Treaty into force. Let us take the last steps of this long journey and finish one of the longest sought international instruments in the area of non-proliferation and disarmament. We owe it to ourselves, and to future generations."**

*Joint Statement by Kazakh Foreign Affairs Minister  
Beibut Atankulov and CTBTO Executive Secretary  
Lassina Zerbo, International Day against Nuclear  
Tests, 2019*

Seventy-five years ago – on 16 July, 1945 – the world's first nuclear explosion seared the desert of New Mexico. The plutonium-based, implosion-type device left a crater more than 300 metres wide and prompted one of its creators, Robert Oppenheimer, to quote Hindu scripture: "Now I am become Death, the destroyer of worlds." The U.S. 'Trinity' test, carried out at the Alamogordo Test Range, was the first of more than 2,000 nuclear tests to be conducted worldwide over the following half-century. These tests have released vast amounts of radioactive contamination around the globe, altering the very nature of our environment. Traces

of the radioactive isotope carbon-14 created by nuclear bomb tests can be used in carbon dating, and have been found in sea creatures in the very deepest part of the ocean.<sup>1</sup> The UN Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) notes that nuclear testing in the atmosphere, which ran from 1945 to 1980, was the most significant cause of human exposure to man-made environmental sources of radiation. "Each nuclear test resulted in unrestrained release into the environment of substantial quantities of radioactive materials, which were widely dispersed in the atmosphere and deposited everywhere on the Earth's surface," UNSCEAR said in its report



The area known as “Darse Denise” at France’s Centre d’expérimentation du Pacifique (CEP) in Mururoa, French Polynesia in 1987. (photo: CEA)

The “Darse Denise” area in 1998 after the closure of the CEP. (photo: CEA)



Tower erected for the joint UK/US Icecap test scheduled for 1993. The tower still remains at the Nevada National Security Site. (Photo: NNSA)



The “Fregate” area of the CEP in Fangataufa, French Polynesia in 1966. (photo: CEA)



The “Fregate” area in 1998 after the closure of the CEP. (photo: CEA)



to the General Assembly in 2000. More than 60 locations worldwide have been used as test sites for nuclear explosions, and in many cases they have left a bleak legacy of ill-health and environmental damage for those directly affected – especially where tests failed to go as planned or the scale of their impact was not foreseen. This legacy of harm is testimony to the vital importance of the Comprehensive Nuclear-Test-Ban Treaty (CTBT). From the 1990s, moves by several nuclear weapon states to halt their own nuclear test explosions helped to set the stage for the global moratorium underpinned by the CTBT since 1996. Fewer than a dozen

nuclear tests have been conducted in the 24 years since the Treaty opened for signature, and only one country, North Korea, has done so this century. Some nuclear test sites have been permanently closed. In 1991 Kazakhstan shut down the huge Semipalatinsk site, which had been the primary testing site for the Soviet Union. The date of its closure, 29 August, was later designated by the UN General Assembly as the International Day against Nuclear Tests (IDANT). France has shut and dismantled all its test sites – the only nuclear weapon state so far to do so. Other locations have been frozen in time. At the Nevada National Security Site in the United States,

a white tower nearly 50 metres tall stands as it was in 1992, in preparation for a joint US-UK underground test called Icecap. The test was cancelled when the United States halted its nuclear weapon testing. But there is no room for complacency. Until eight more specific states with nuclear technology ratify the CTBT, it cannot become legally binding. At a time when the international nuclear non-proliferation and disarmament regime is increasingly under pressure, the only way to secure all of the CTBT’s benefits for all time is to bring the Treaty into force.

<sup>1</sup> Scientific American, “Bomb Carbon” Has Been Found in Deep-Ocean Creatures, May 15, 2019. <https://www.scientificamerican.com/article/bomb-carbon-has-been-found-in-deep-ocean-creatures/>

*The educational  
expedition to visit the  
former Semipalatinsk  
nuclear testing site  
organized by the Center  
for International Security  
and Policy (Kazakhstan).  
Photo: Oleg Butenko*





# Living with the Nuclear Tests: the Semipalatinsk Story

BY TOGZHAN KASSENOVA

**The now-closed nuclear test site of Semipalatinsk in Kazakhstan stands as a symbol of the lasting pain of worldwide nuclear testing.**

In the late 1940s, the Soviet leaders rushed to develop nuclear weapons, determined to catch up with the United States. To test them, they chose the Semipalatinsk region in the northeast part of then Soviet Kazakhstan.

For military and nuclear scientists, this was a perfect piece of land – flat steppes (grassland similar to a prairie), access to river and construction material – wood, sand, and stone. Away from major cities and far from major transportation hubs. But distance proved relative once nuclear tests began in 1949. Residents of Semipalatinsk, a relatively large city 120 kilometers away, and especially the locals in rural settlements close to the testing site, suffered firsthand the horrors of nuclear tests. What appeared as harsh and barren steppe to Soviet military planners was to Kazakhs treasured ancestral land. Kazakhs feel a deep affinity for their land and place of birth, and the Semipalatinsk region holds a special place in the Kazakh national consciousness. It was a cradle to Kazakh literature. Some of Kazakhstan's most famous writers, poets, composers, and intellectuals were born there.

Before the Soviet military arrived, Kazakh shepherds roamed the generous pastures that provided food for their cattle. Soon, the land that prided itself on raising livestock, feeding the country with the best

meat and producing fresh milk, became contaminated with radiation. For forty years, between 1949 and 1989, the Soviet military tested more than 450 nuclear bombs – in the atmosphere and underground – at the Semipalatinsk test site with devastating consequences for the land and the people.<sup>1</sup>

## TRAUMA

The impact of nuclear tests on people was both immediate with injuries and disruption during the tests and long-term when serious health issues started manifesting themselves. What it felt like to live in the vicinity of nuclear explosions? The story of the Soviet thermonuclear breakthrough and the test of Andrei Sakharov's famous "Sloika" ("layer cake") device in 1953 is a telling example.

Until the last moment, nobody gave any thought that the radioactive fallout from such a powerful explosion would spread beyond the testing site. In a rush, Sakharov and others made calculations about the fallout. They concluded that everyone within the zone where radiation could exceed 200 roentgen had to be evacuated. They also concluded that a dose of 100 roentgen would injure children and people of fragile health. There were two choices: to delay the test by months and prepare for a different method of the explosion – from a plane instead of from a tower, or evacuate the locals.<sup>2</sup>

A massive evacuation operation began. Hundreds of Army trucks drove thousands of locals away from their homes and hundreds of thousands of livestock to safer areas. One witness

**Thirty years since the last nuclear test at the Semipalatinsk Nuclear Test site, there is still no clear, comprehensive picture of the total impact of nuclear tests on locals' health.**

described a scene of confusion: "Why? Where? Neither the soldiers nor the shocked locals knew. Panic reigned in the steppe; bewildered people waited for something terrible to happen."<sup>3</sup> The thermonuclear test resulted in radioactive contamination of more than 1 roentgen up to 400 kilometers away from the site; the residents in nearby villages who could not evacuate received 10-40 roentgen.<sup>4</sup> Whether the massive evacuation protected the locals remained an open question with some experts saying that the fallout occurred in the zone where people waited.<sup>5</sup> A follow up thermonuclear test, in 1955, brought similar disruption to the life of locals. A medical nurse from a village 100 kilometers away from the epicenter, described: "On the eve of the test, the military came to our village and gave instructions. In the morning, after breakfast [...] we walked all sick [patients staying at the hospital] outside, put them face down to the ground and covered with bed sheets."<sup>6</sup> When a bomb with a yield of 1.6 megatons was dropped from a plane, in Semipalatinsk, 120 kilometers away, at the city's main meat-processing factory, industrial lights shattered

and fell into ground beef.<sup>7</sup> Many locals suffered injuries, including broken bones. In a hospital, in a women's ward, half a dozen people were injured by a crashed ceiling. A three-year-old girl died when a bomb shelter where she was hiding with her parents collapsed.<sup>8</sup> Five soldiers were injured during the test, and one died. They were waiting in trenches 36 kilometers away from the ground zero when the soil collapsed on them.<sup>9</sup> These are just two examples from a history of 400+ tests. People were forced to live with earth shaking beneath them, and walls in their house getting cracks. Above all, they were forced to live in the state of fear of the unknown, facing the invisible danger that started ruining their health.

#### HEALTH CONSEQUENCES

Thirty years since the last nuclear test at the Semipalatinsk Nuclear Test site, there is still no clear, comprehensive picture of the total impact of nuclear tests on locals' health. Few documents from the past available to scholars paint a picture of conflicting narratives. Thus, for example, the Institute of Biophysics in Moscow, controlled by the Soviet military, would admit the negative impact of nuclear tests on the local population in secret reports, but in its official statements, the military would insist that locals' health problems stemmed from poor diet and living conditions.

In the late 1950s, Kazakhstan's scientists had a rare opportunity to conduct clinical studies of their own. For three years, the scientists from the Institute of Regional Pathology, part of Kazakhstan's Academy of Sciences, painstakingly examined thousands of people, going from one village to another. The clinical data they collected is the most detailed account available to scholars. The scientists from the Institute of Regional Pathology recorded that blood did not circulate properly in people's brains. Those who were exposed long-term to high

amounts of radioactivity lost the sense of smell and taste. They suffered from changes to their noses, ears, and throats. The neurological pathologies made people tired and caused headaches and dizziness. Many locals were losing their swallowing reflex – the body's essential defense mechanism against choking on food.<sup>10</sup> After the closure of the test site and Kazakhstan gaining independence in 1991, Kazakhstan's scientists together with their international colleagues carried out studies that added new information to the picture.

In 1998, the experts from the Kazakh Scientific Research Institution for Radiation Medicine and Ecology re-examined clinical data collected by the special medical facility established in Semipalatinsk to monitor locals' health (the facility was disguised as an anti-brucellosis clinic). Their report noted that excess cancer rates were on the rise in affected areas up to 1970, and a post-1970

**The best way to honor the Semipalatinsk region and its people is for the international community never to allow another nuclear tragedy to happen.**

decrease was followed by a second increase in the late 1980s. The data revealed an initial peak in reports of cancer of esophagus, stomach, and liver, followed by a second peak of lung, breast, and thyroid cancers.<sup>11</sup> Several studies confirm the impact of radiation on the thyroid gland in the Semipalatinsk region. In one of them, the specialists examined 1,100 people to investigate how the combined effect of ionizing radiation and iodine deficiency contributed to pathologies of the thyroid gland.

*Stronger Than Death memorial for victims of the nuclear tests. It depicts a mother covering her child from a bomb. Semey (former Semipalatinsk), Kazakhstan. Photo: Togzhan Kassenova*



The specialists found that 75 percent of people examined suffered from thyroid pathology.<sup>12</sup> Another study conducted by a joint team of US, Kazakh, and Russian specialists found that the occurrence of thyroid nodules was linked with external and internal exposure to radiation.<sup>13</sup> Kazakh and Japanese scientists studied the mental toll of nuclear testing and concluded that individuals who experienced nuclear tests at Semipalatinsk exhibited psychological symptoms similar to hibakusha—survivors of 1945 nuclear attacks on Hiroshima and Nagasaki.<sup>14</sup>

The Semipalatinsk tragedy will remain an open wound for Kazakhstan for decades to come.<sup>15</sup> But the people in the Semipalatinsk region do not want to be seen merely as victims. They wish for their loss and pain to be acknowledged, but they do not want to be defined by the horrors of the past. The best way to honor the Semipalatinsk region and its people is for the international community never to allow another nuclear tragedy to happen.

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*A team of technicians working to fix the VSAT antenna. In the background an operator is installing the GPS receiver.*

# Giving a second life to Senegal's auxiliary seismic station

BY MAPATHÉ NDIAYE

Of the 120 auxiliary seismic monitoring stations agreed under the Comprehensive Nuclear-Test-Ban Treaty to help verify compliance, 108 are now certified. This is the story of one of them.

Babate (BBTS) is a station in the CTBTO International Monitoring System (IMS) auxiliary seismic network in Senegal, with the Treaty code AS097. The installation of BBTS was completed in December 2006 with certification in February 2007. From 2007 to 2008, the station was actively managed by the Institute of Research for Development (IRD). After 2008, BBTS suffered from IRD activities being scaled back and was progressively abandoned. This resulted in the station being out of service for several years. In 2014, the General Direction of

Research of the Ministry of Research of Senegal, in collaboration with the CTBTO, decided to repair BBTS. A new team with a new focal point and a new station operator was created. The station went through several steps to restore its capability. This article is a review of the main steps performed to give a second life to BBTS.

The history of BBTS began in early 2001 when the first site survey was performed to verify if the site chosen under the Treaty was suitable for acquiring high quality seismic data



for the IMS. According to the Treaty, BBTS was to have been located inside the Geophysical Observatory, in the IRD Research Center, in the City of Mbour with the great advantage of being operated by the IRD.

Unfortunately, seismic background noise from industrial and other activities in Mbour, which is quite a large city, was too high and one of Senegal's busy main national roads borders the IRD Center. This made the Treaty site, despite all the advantages linked to its location, not suitable for AS097 installation. Alternate sites had therefore to be found. Potential replacement sites were selected not too far from the IRD Research Center at Wady Tabakaly and Babate, 144 km and 75 km away from Mbour. Site surveys showed that background noise at the two sites was almost identical, low and within the acceptable range. Babate was finally selected because it was closer to the IRD Centre. This explains the local name BBTS chosen for AS097.

Construction and installation of AS097 started in February 2004 and took two years. All the steps were completed on time except for installation of the seismic equipment, which was postponed due to technical problems from a borehole that was not waterproof. It took almost a year to resolve this issue by drilling a second borehole. From February 2007, the site was tested and certified and began providing accurate and reliable data. It was regularly maintained and monitored by the IRD. But after five years, in April 2012, BBTS was progressively facing issues. IRD decreased its activities and the station suffered from a lack of manpower. In January 2013 the station was completely abandoned and no data was received from AS097 between May 2012 and August 2015.

Giving AS097 a second life to become a major objective of the General Direction of Research (DGR) of the Ministry of Research of Senegal and

a new team was set up to restore the station, working hand in hand with the CTBTO to meet the challenge. In October 2015 an initial repair mission was organized consisting of CTBTO staff and technicians from the Senegalese Ministry of Research, scientists and the director of research. This first mission repaired the Global Communication Infrastructure (GCI) link, the Central Recording Facility (CRF) equipment and configured the station. It was successful in taking big steps in a single day mission, a real motivation for everybody.

Some weeks later, in November 2015, we noted that there was a data transmission failure every night, right after sunset. After investigation, we understood that the problem came from batteries that had lost their capacity after the five years break. The battery bank therefore had to be changed. After investigating the local market for several months and not finding good quality batteries to meet our technical specifications, we finally decided to import them. Once the power supply problem was fixed, we were proud to see AS097 running again and sending satisfactory data to the CTBTO's International Data Centre (IDC).

In October 2016 we ran a routine calibration. The results showed some problems on the sensor vertical component BH2 (component number 3 of the borehole sensor). In fact, the amplitude of the signal was twice as high on BH1 (component No 1 of the borehole sensor) than BH2. At a first sight, we suspected the problem coming from digitizer settings. But further verifications convinced us that both the sensor and the digitizer were faulty. Our first option was to send the sensor for repair but we finally decided to change the sensor. A lot of paperwork was needed regarding custom clearance but we stayed motivated until we got our new seismometer delivered. We planned a final mission to change

the seismometer. For precautions, we got assistance from a Guralp specialist who helped us change, configure and test the new seismometers. On 29 January 2018, months since our challenge started, AS097 was back to life and in good condition. We took advantage of Global Communication Infrastructure (GCI3) migration to setup a remote and redundant access to BBTS for full time monitoring to make sure AS097 is roadworthy.

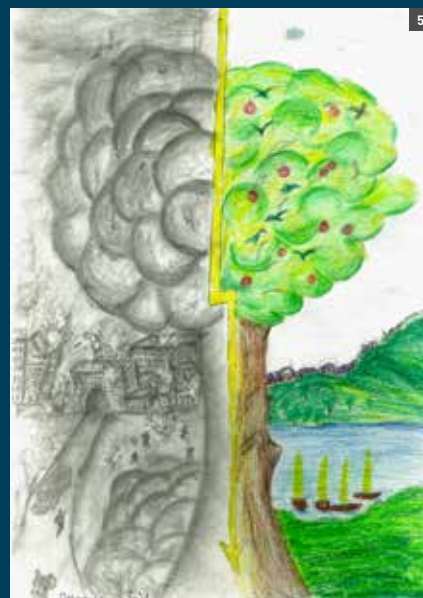
#### EDITORIAL NOTE:

Since August 2019, AS097 at Babate has faced new technical challenges. Nevertheless, as of June 2020 it was continuing to transmit data to the IDC in Vienna.

*Changing the old borehole seismometer*



# Global Scholar Art Campaign organised by CTBTO and Paz y Cooperación



- 1 Plamena Krasimirova Krasteva, age 11 (Bulgaria)
- 2 Ermina Kalogirou, age 16 (Cyprus)
- 3 Islam Zinaenur, age 14 (Kazakhstan)
- 4 Fatemeh Yavarzadeh, age 10 (Iran)
- 5 Mahmoud Mostafa Negm, age 10 (Egypt)
- 6 Jordan Titus, age 15 (Namibia)
- 7 Alvaro Cobos Palacino, age 6 (Spain)

Talented young artists from all around the world contributed to the campaign, entitled "For a safer world – join forces with the CTBTO", which was launched on 29 August 2018 on the International Day against Nuclear Tests (IDANT). Together with our Madrid-based partner, Paz y Cooperación, we made a global call to children from around the world to submit a drawing or painting that would increase public awareness of the vital goal of putting an end to nuclear explosions and working together for a safer world. We also believed that the many scientific and civil applications of the data collected by the CTBTO's global verification system could inspire younger generations to

promote the work of the CTBTO. Over 1000 works of art were received from 25 countries: Austria, Azerbaijan, Belarus, Bosnia and Herzegovina, Bulgaria, Cameroon, China, Cyprus, Colombia, Croatia, Dominican Republic, Egypt, Iran, Kenya, Kazakhstan, Latvia, Mexico, Montenegro, Namibia, New Zealand, Peru, Russia, Seychelles, Spain and the United Kingdom. An award ceremony was held on 27 June 2019 during the CTBTO Science and Technology 2019 Conference at Vienna's historic Hofburg Palace. A virtual art gallery with more than 200 artworks from the campaign is available in the CTBTO Flickr album.





Yampier Abel Chilon Saboya and Mary Ann Arizaga Saldarriaga, age 16 (Peru)

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Printed in Austria, July 2020

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#### PUBLISHED BY:

Public Information  
Preparatory Commission for the  
Comprehensive Nuclear-Test-Ban  
Treaty Organization (CTBTO)

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CTBTO Spectrum – ISSN: 1680-533X



