CHORNOBYL:[1]
ONE SMALL STEP FOR COSMOS,
ONE GIANT LEAP FOR HUMANKIND

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> *"In estranging from man (1) nature, and (2) himself, his own active functions, his life activity, estranged labor estranges the* ***species*** *from man. It changes for him the* ***life of the species*** *into a means of individual life. First it estranges the life of the species and individual life, and secondly it makes individual life in its abstract form the purpose of the life of the species, likewise in its abstract and estranged form. . . . Estranged labor turns thus: (3)* ***Man's species-being****, both nature and his spiritual species-property, into a being* ***alien*** *to him, into a* ***means*** *of his* ***individual existence.*** *It estranges from man his own body, as well as external nature and his spiritual aspect, his* ***human*** *aspect. (4) An immediate consequence of the fact that man is estranged from the product of his labor, from his life activity, from his species-being, is the* ***estrangement of man from man****. When man confronts himself, he confronts the* ***other*** *man."*[2]
>
> Karl Marx, 1844

PROLOGUE:
PHOTOGRAPHER

The Chaosmos project, which I started in 2012, was a quest to confront with a dystopic fiction based on subjective perception and personal observations—as opposed to a

[1] In this text, the Ukranian cities have been referred to with their Ukranian names, "Chornobyl" and "Kyiv," in accordance with how they have been known in this region for centuries, instead of "Chernobyl" and "Kiev," as the two cities are commonly referred to in English, in line with their Russian names.
[2] Karl Marx, Economic and Philosophical Manuscripts of 1844, https://www.marxists.org/archive/marx/works/1844/manuscripts/labour.htm.

documentarian one—and which focused on the traces of the postindustrial crisis and the ensuing collapse.

It was a work that combed through the traces of a process in which humankind's unbounded urge to dominate nature and the "other" triggers their alienation from their labor along with themselves, which ultimately causes the destruction of all humankind. For me, Chaosmos simultaneously contained Narcissus within itself. With a slightly different reading, I could envision humankind's glorification of his or her own production causing its eventual demise.

Chaosmos was a work that evaluated the photographs as present-day reflections of the absolute end of nature and humanity quickly brought forth in a world where existence is equated with the concept of growth, and where the process of producing more, consuming more, and even reproducing more as a result of competitive policies becomes increasingly restrictive.

The photographs were taken across a worldwide journey ending in 2017, extending from the Aral Sea, which has become a desert due to the agricultural policies implemented from Kazakhstan to Detroit and has transformed into a ghost city as a result of the US automotive industry's inability to survive against the competitive world markets. This is evident from the abandoned Iwate coal mines of Japan and the remnants of nuclear disasters in Chornobyl, Ukraine, and Fukushima, Japan, to the traces of the Cold War across the Balkans in former Yugoslavia and the mental hospitals in Northern Italy, shut down following the reactions to alleged human rights violations, and to many other locations in pursuit of fallen civilizations.

I intended to access the viewer's emotions through my photographs rather than convey information, introduce a location, or witness a process. I chose not to tell the story of these photographs or disclose information regarding where and when they were taken. I sought to collate them by the common aspects of the different places. I wanted these photographs taken in distant lands to affect the viewer in a way that prevents them from sheltering in the comfort of looking at the pain of the so-called other. Another common feature of my chosen locations was that many of these places bore traces of the

developments of my childhood (in the late 1960s and early 1970s), and the times when we looked forward to the future.

I first went to Chornobyl with Halil Koyutürk in July 2015. Our meeting with Nikolai Fomin marked the beginning of a friendship that would last for many years. In time, the Chornobyl adventure transformed into something more than just an important component of the Chaosmos project, and metamorphosed into a medium where a new project would be developed. But this time, the time and place were fixed. I had to dig deeper, and convert my work into an archaeological excavation.

Pripyat was fascinating. The city was deserted; time seemed to have frozen. The wildness of nature was slowly reclaiming what it had formerly lent to people; a forest surrounded the city. Trees were growing inside buildings. Schools, hospitals, apartments, and gyms were all silent.

The sarcophagus, which harbored a legend, was visible from afar with all its magnificence.

The villages that were inaccessible for tourists who constantly took selfies were even more impressive. Many of them were uninhabited, essentially absorbed by the jungle. There were also villages with three to five residents—either new settlers or people who had returned. Women, most of whom were over eighty years old, lived here in peace. When they died, their homes were sealed shut and pillaged soon after, like all the other houses.

The branches drooped to the ground with the weight of the fruits they bore, and swayed along with the blowing wind as the Przewalski horses watched their intruders from afar.

My friendship with Nikolai developed. Over the years, he joined me on my numerous trips to Chornobyl. He became my companion. He now knew what kind of photographs I wanted to take, and made suggestions about where we should be at what time of day. As I focused on the details of a location, he would scan the environment, suggesting spots that might interest me, and motivating me at times when I felt exhausted because of the repetition.

In October 2018, I went to Chornobyl with Nergis Perçinel. Nergis drew my attention to photographs hanging on a kindergarten wall. Photographs I had passed by many times before, unaware.

Dust, humidity, and mold!

Photographs of children and families who had once lived there.

Nergis's suggestion opened up new horizons for me. During my subsequent visits, I focused on these photographs. I spent days with the photo albums I found inside drawers in schools, official buildings, and village houses. These photographs provided me with the most direct path to the traces and the special moments of the people who once lived here.

Their faces seemed to seek something, like they wanted their voices from the past to be heard in the present.

My final visit to Chornobyl was in February 2020. The World Health Organization had not yet declared COVID-19 a pandemic, and what had happened in Wuhan in December 2019 was still the problem of the "other" for us. But in the globalized world, the "other" was now among us, and in March 2020, we were all shaken up with a brand-new process that would impact our lives deeply.

INTERLUDE:
CHORNOBYL

BEGINNING OF AN ERA

> *"The revolution has resulted in Russia catching up with the advanced countries in a few months, as far as her political system is concerned. But that is not enough.*

The war is inexorable; it puts the alternative with ruthless severity: either perish or overtake and outstrip the advanced countries ***economically*** *as well."*[3]

V. I. Lenin, 1917

Rapid industrialization, social transformation, proletarianization of the masses, and catching up and surpassing the level of productivity of the labor force found in the most advanced capitalist countries were all inevitable for the socialist rule, which was now faced with the necessity of being established as a single country.

"Communism is Soviet power plus the electrification of the whole country."[4]

V. I. Lenin, 1920

The State Electrification Commission of Russia (GOELRO) was established on February 21, 1920, for the purpose of economic recovery and development, and became the prototype for subsequent five-year plans drafted by Gosplan. This plan, envisaged a major restructuring of the Soviet economy, was based on the total electrification of the country. The objective was the organization of industry on the basis of modern, advanced technology and electrification, which would put an end to the division between town and country. The establishment of heavy industry was seen as a precondition for being an independent and civilized country.[5]

In 1913, the annual electricity production of the Russian Empire could reach 1.9 billion kWh. The target was to increase the total annual national power generation to 8.8 billion kWh. The target set for 1931 was reached and the national power output continued to

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[3] Vladimir Lenin, "The Impending Catastrophe and How to Combat It," in vol. 25, *Collected Works* (Moscow: Progress Publishers, 1977), https://www.marxists.org/archive/lenin/works/1917/ichtci/index.htm.

[4] Vladimir Lenin, "Our Foreign and Domestic Position and Party Tasks: Speech Delivered to the Moscow Gubernia Conference Of The R.C.P.(B.), November 21, 1920," in vol. 31, *Collected Works*, trans. by Julius Katzer (Progress Publishers: Moscow, 1965), https://www.marxists.org/archive/lenin/works/1920/nov/21.htm.

[5] Yalçın Küçük, *Sovyetler Birliği'nde sosyalizmin kuruluşu 1925–1940* (Istanbul: Tekin Yayınevi, 1987).

surge significantly, reaching 13.5 billion kWh by the end of the first five-year plan in 1932, 36 billion kWh by 1937, and 48 billion kWh in 1940.[6]

Despite the great devastation and the casualties of World War II, the USSR became the world's second largest electricity producer after the United States in the postwar period.[7]

NUCLEAR ENERGY

> "May the atom be a worker and not a soldier."[8]

After the atomic bombs dropped by the United States on Hiroshima and Nagasaki on August 6 and 9, 1945, and before the successful secret trial of the first Soviet nuclear bomb on August 29, 1949, Soviet engineers and scientists had begun to advocate the use of nuclear power for civilian purposes.

The Obninsk Power Plant, which was commissioned on June 27, 1954, was not only the USSR's but also the world's first nuclear power plant to feed the grid.[9]

The ensuing enthusiasm and hope inspired lines of poetry:

> *"Atoms for Peace*
> *Read, Drink with your eyes the lines:*
> *The inevitable came true,*
> *the newest of the miracles of the earth*
> *The uranium forces*

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[6] J. Coopersmith, *The Electrification of Russia: 1880–1926* (New York: Cornell University Press, 1992), https://www.cornellpress.cornell.edu/book/9781501705366/the-electrification-of russia-18801926/#bookTabs=1.

[7] "The Russian Power Revolution," *Power*, January 1, 2013, https://www.powermag.com/the-russian-power-revolution/.

[8] Three-meter-high letters in neon lights, presenting the Soviet slogan on the roof of a nine-story high-rise block facing the main square of Pripyat.

[9] A. M. Petros'yants, "A Pioneer of Nuclear Power," *IAEA Bulletin* 26, no. 4 (December 1984): 42–46, https://www.iaea.org/sites/default/files/26404794246.pdf.

by electric current
Over Soviet wires started to run!
And somewhere,
echoing to hearts inspired
In this festive humdrum hour,
In honor of peace
new motors began to drone,
And flashed up
the lamps of Il'ich.
The river of Time
will carry away into silence
The cannibal's pyre
on the island Eniwetok,
But our Atom of Peace
child of Five-Year Plans,
For people
will shine for ages,
What was a dream, a fledgling yesterday,
Today is trying out
its powerful wings.
Glory be to those masters,
Who, out of the fairy tales
of the days by gone,
Created this reality.[10]

Igor Volski, 1954

The development of the nuclear energy program in the USSR was the result of the advancement of the nuclear weapons industry, just as it had been in the United States, the

[10] Igor Volski, cited in William C. Potter, "Soviet Decision Making for Chernobyl: An Analysis of System Performance and Policy Change," transcript of speech presented at UCLA, March 1990, chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.ucis.pitt.edu/nceeer/1990-802-12-Potter.pdf.

UK, and France. The development in other Comecon countries was similar to the process in the USSR.

Considering the increasing cost of coal and petroleum products and the difficulty of transportation and distribution in large regions with long distances and harsh geographical conditions, gravitating toward nuclear power for electricity generation emerged as a reasonable option. The USSR was cultivating its political power by keeping energy production under its control, encouraging other Comecon countries to turn to nuclear energy, and planning to export reactors.

By 1960, the USSR's electricity production had reached 290 billion kWh. The 1970s was the period when the USSR made a breakthrough in electricity generation in nuclear power plants. By 1981, the total electricity production of nuclear power plants had reached 86 billion kWh and this corresponded to 6.5 percent of the world's total electricity production. In the following five years, the total production of nuclear power plants tripled, reaching 220 billion kWh. In 1985, nuclear power plants accounted for 14 percent of the total 1,500 billion kWh electricity generated. By the 1990s, the USSR's production had reached 1,728 billion kWh, which was 17 percent of the world's total production. However, despite having reached two hundred times the target set for the first five-year plan, it was still not sufficient to meet the astronomical needs of the USSR's energy-hungry industry.[11]

> *"Human nature has many curious perversities, and one of the most curious is this; that we tend to worship whatever is useful to us, and, by worshipping it, to deprive it of its utility."*[12]
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> Dora and Bertrand Russell, 1923

[11] William G. Davey, "Nuclear Power in the Soviet Block," internally distributed report, Los Alamos, New Mexico, 1982, courtesy the US Department of Energy, Office of Scientific and Technical Information (OSTI), chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.osti.gov/servlets/purl/5137371.

[12] Dora Russell and Bertrand Russell, *The Prospects of Industrial Revolution* (London: George Allen & Unwin, 1923), chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://ia801407.us.archive.org/19/items/in.ernet.dli.2015.36391/2015.36391.Prospects-Of-Industrial-Civilization.pdf.

Before the Chornobyl disaster in 1986, the perception of nuclear safety was extremely limited and was generally not considered within the context of anything other than thermal energy; nuclear energy was assumed to be safe without any doubt, and it was frequently referred to being "ten times more environmentally friendly than coal power plants." Soviet nuclear power plants were highlighted as marvels of technology and the possibility of a serious accident was not considered as a realistic one. In 1975, P. Kapitsa warned that new nuclear power plants should not be built in densely populated areas, due to a potential radioactive waste issue or leakage that might occur as a result of an accident or sabotage. In a similar vein, N. Dollezhal and I. Koryakin published articles in *Pravda* in 1976 and in 1979 in *Kommunist* asserting that the ecological capacity of the regions where new nuclear power plants were located could not provide the necessary resources for cooling water in the long term. However, these warnings were either ignored or "refuted" by the Academy of Sciences of the Soviet Union.

"Does any generation have the right to risk the safety of so many future generations?"[13]

Robert Polidori, 2001

The United States House Committee on Science, Space, and Technology, appointed in 1970, expressed the view that the Soviets adopted a design- and operation-oriented security approach but ignored hypothetical possibilities, and pointed out that Soviet scientists did not equip systems with backup mechanisms, with the prediction that it would complicate the systems and make them less secure. Avoiding "unnecessary" investment costs was also in line with management's demands. On the other hand, Soviet officials made the assessment that the Three Mile Island nuclear accident in the United States in 1979 was allegedly "due to the nature of the American economic system," while lagging to take steps to improve the rules and regulations for the design and operation of Soviet nuclear power plants and instead choosing to spread out the process over time.

The Vladimir Ilyich Lenin Nuclear Power Plant built in Chornobyl consisted of four RBMK-1000 reactors. The city of Pripyat, established in 1970, near the Belarusian

[13] Robert Polidori, *Zones of Exclusion: Pripyat and Chernobyl* (Göttingen, Germany: Steidl, 2003).

border in the northern part of Ukraine, was designed as a residential town for the employees of the power plant and their families. The first reactor that was commissioned in 1977 was followed by the second, third, and fourth reactors commissioned in 1978, 1981, and finally in 1983, respectively. These four reactors were capable of fulfilling 10 percent of Ukraine's electricity needs. The construction of reactors No. 5 and 6 began later. The plan was to build six more reactors, with a total of twelve reactors to be commissioned by 2010.

THE ACCIDENT

On April 25, 1986, the prescheduled test for reactor No. 4 began with a ten-hour delay.[14] The experienced daytime workers had left, and the shift was handed over to the night crew. In case of an electrical power outage, the residual rotational energy in the turbine was expected to provide enough power to feed the main cooling water circulation pumps, while the backup diesel generators would be activated and the cooling process of the core would continue uninterrupted. However, the decelerating turbine rapidly collapsed, and was unable to provide sufficient power. The vulnerability of the system of information flow combined with the shift officers' limited understanding of the procedures and the lack of coordination between the operators and the nuclear reactor security staff caused the situation to spiral out of control.[15]

As a result of a series of chain reactions, two consecutive explosions were heard at 1:24 a.m. on April 26, 1986.

A report labeled "Confidential" signed by V. K. Bryukhanov was sent to the Communist Party officials in Kyiv and Moscow. The report noted that the reactor roof and walls were destroyed by the severity of the explosion; the ensuing fire was brought under control at

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[14] Adam Higginbotham, "'An Explosion Occurred in Power Unit No. 4': The Story of Chernobyl in Documents, *Sources and Methods* (blog), Wilson Center, April 26, 2019, https://www.wilsoncenter.org/blog-post/explosion-occurred-power-unit-no-4-the-story-chernobyl-documents.

[15] "Chernobyl: Chronology of a Disaster," *Nuclear Monitor*, March 11, 2001, chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.nirs.org/wp-content/uploads/mononline/nm724.pdf.

4:50 a.m.; nine officers were injured, one was missing, and one was deceased; some of the power plant officers and firefighters who were trying to extinguish the fire were sent to regional hospitals for observation; and twenty-six people were sent to Moscow on a private plane. It was also reported that according to the readings taken in Pripyat at 3:00 a.m., the radiation level was detected to be at 0.1–0.5 mSv per hour, and 0.1–0.2 mSv at 7:00 a.m., whereas a value of 30 mSv was detected in the area where the accident occurred.

At this stage, it wasn't yet known that the reactor core had exploded or that such a thing was even possible; the assumption was that it was the hydrogen tank that had exploded. The reported radiation levels were also inaccurate. The limits of the dosimeters used by the officers were limited to 3 mSv per hour and the needle had hit the limit, unable to provide a reading. The severity of the accident was only going to be comprehended following the discovery of graphite pieces scattered around the area.

The engineers in the control room were in a state of panic. The situation was out of control and they didn't know what was happening. They thought that the reactor was still active and thus maintaining the cooling water circulation was still a priority, but they were unable to activate the remote-controlled valves. Three engineers went to the pump room and turned on the valves.

Firefighters immediately arrived to extinguish the fires. The top priority was to extinguish the fire on and around the roof of the building where reactor No. 4 was located, and to secure reactor No. 3 and the cooling systems. The fires were extinguished, but many firefighters were exposed to high doses of radiation. However, the fire inside reactor No. 4 continued.

In order to control the situation and ensure order, personnel and equipment of the Ministry of the Interior, the KGB, civil defense, and the Soviet army—including 2,900 men from the Ukrainian Ministry of Internal Affairs—were directed toward the plant, while reinforcements were kept at the ready for intervention. Military helicopters also supported the operations.

Research committee member Professor Valery Legasov, who would later be commissioned to investigate the process and forced to constantly resist pressure from the bureaucratic management, kept urging for the evacuation of Pripyat.

EVACUATION

At 8:00 p.m. on April 26, a secret order was issued to Pripyat for the preparation and dispatch of 1,390 buses from Kyiv and its surroundings for the possible evacuation of 51,000 people. Furthermore, hundreds of buses as well as trucks, ambulances, trains, and river ships were assigned to support when needed.

> *"For the attention of the residents of Pripyat! The City Council informs you that due to the accident at Chernobyl Power Station in the city of Pripyat the radioactive conditions in the vicinity are deteriorating. The Communist Party, its officials and the armed forces are taking necessary steps to combat this. Nevertheless, with the view to keep people as safe and healthy as possible, the children being top priority, we need to temporarily evacuate the citizens in the nearest towns of the Kiev region. For these reasons, starting from April 27, 1986, 2 p.m. each apartment block will be able to have a bus at its disposal, supervised by the police and the city officials. It is highly advisable to take your documents, some vital personal belongings and a certain amount of food, just in case, with you. The senior executives of public and industrial facilities of the city has decided on the list of employees needed to stay in Pripyat to maintain these facilities in a good working order. All the houses will be guarded by the police during the evacuation period. Comrades, leaving your residences temporarily please make sure you have turned off the lights, electrical equipment and water and shut the windows. Please keep calm and orderly in the process of this short-term evacuation."*[16]

The evacuation of Pripyat started on April 27 at 1:30 p.m. Pripyat residents were told that they would return home in three days, though many would never see their homes again.

[16] Translated excerpt of the evacuation announcement, April 27, 1986. Eddie Gerald, "Chernobyl, 30 Years After," https://www.geo-pix.com/chernobyl.

By 3 p.m. on the first day, 53,000 people were evacuated. The following day, talks began with regard to the evacuation of people from the ten-kilometer zone. Ten days after the accident, the evacuation area was expanded to thirty kilometers. While the Chernobyl Exclusion Zone has since remained, its borders have changed. The inclusion of isolated nuclear fallout hotspots outside this thirty-kilometer zone over the following year eventually increased the number of evacuees to 135,000. With those evacuated between 1986 and 2000, the total number of permanently resettled persons reached approximately 350,000.

> *"We were waiting for them to explain it on the TV. For them to tell us how to keep safe. But the worms, just ordinary worms, they buried themselves deep in the ground, a good half a metre or one metre down. We couldn't make sense of it. We kept digging and digging, but couldn't find a single worm for our fishing."*[17]
>
> Svetlana Alexievich, 1997

On April 29, evacuation started in Chornobyl and the surrounding residential areas. In the environmental measurements, levels of radioactivity were found to be above normal values. Radiation levels taken on the highway connecting the region to Kyiv showed an increase, and radiation measurement and control mechanisms were introduced for vehicles coming from the region. Regular radiation testing commenced in water basins of Kyiv and surrounding residential areas. High levels of radioactivity were detected in agricultural areas in the Chornobyl region and the Kyiv Oblast region. Testing was started on animals and animal products.[18]

Twelve thousand hospital beds were prepared in Kyiv and its surrounding area to serve those evacuated from the region, and experienced healthcare professionals were assigned to these hospitals. In the first stage, out of the 468 patients—seventy-nine of whom were children—thirty-eight were diagnosed as affected by radiation.

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[17] Svetlana Alexievich, *Chernobyl Prayer: Voices from Chernobyl* (1997; repr., London: Penguin, 2013), 32.

[18] Higginbotham, "'Explosion Occurred in Power Unit No. 4.'"

The number of people who were resettled in the Kyiv Oblast region after the evacuation was 35,304—97 percent of them were offered jobs. Seventy-five hundred apartments and various dormitories to accommodate an additional one thousand people were provided for evacuees in Kyiv. In Chernigov, an additional five hundred apartments were allocated for Ministry of Energy employees. Furthermore, a construction effort, which included three thousand apartment flats and eight thousand farmhouses as well as the refurbishment of six thousand unused houses in Kyiv Oblast was underway. The 3,684 families who had been evacuated from the twenty-one villages in the Chornobyl region and the three villages in Polessky would thus be offered housing.

In addition to those in Kyiv Oblast, more than 1,300 doctors, 2,300 specialists, technicians, and nurses, 750 medical interns, and 60 scientific research assistants were assigned to support evacuees. All of those evacuated from the region underwent regular and mandatory health screenings. Following a total of 350,500 examinations, tests, and screenings, 11,561 patients—3,983 of whom were children—were found to be affected by radiation, and were referred to scientific research institutes and better equipped hospitals. It was decided that a total of 150,000 people would be kept under prolonged observation.

CHAOS

According to the measurements made on April 28 at 12 p.m., radiation levels in Kyiv were reported to be normal, but the measurements in Pripyat showed that the gamma radiation values had increased and reached a level of 5.7 mSv per hour. Reported by the KGB, this information was confidential.

The clouds loaded with radioactivity, which caused fallout, would change direction and scatter or localize in patches in certain areas with the change of wind direction due to atmospheric movements, especially in mountainous regions. It was recorded that the

clouds were moving in the northwest direction, heading north of the Baltic Sea over Poland and concentrating above Sweden, Finland, Latvia, and Estonia.[19]

The evacuation of the area had begun one and a half days before the official announcement of the accident. On the morning of April 28, alarms were heard at the Forsmark Nuclear Power Plant in Sweden, about 1,100 km from the Chornobyl site. The Swedish government contacted the USSR that same day, inquiring about whether there had been an accident. Although the USSR didn't confirm it initially, they eventually did report the accident in Chornobyl when the Swedish government stated that they were ready to report the situation to the International Atomic Energy Agency.[20]

While the accident had been referred to as a small one, the evacuation of tens of thousands of people revealed its actual scale. On the night of April 28, at 9:02 p.m., a twenty-second announcement was read on *Vremya*, the main news program of Soviet Central Television, informing citizens that there had been an accident at the Chornobyl Nuclear Power Plant, where damage had been detected in one of the reactors, and that further investigation was being carried out to comprehend the full impact of the accident, adding that emergency assistance had been directed to the area and that a research commission had been established. This was the full scope of the announcement, and it was the first time that the USSR had officially announced a nuclear accident. Following this announcement, the Telegraph Agency of the Soviet Union (TASS) broadcast information on the Three Mile Island nuclear accident as well as other nuclear accidents around the world. Classical music replaced the radio programming that had normally been planned for broadcast. Around the same time, ABC News in the United States was presenting its report on the accident.

It had been assumed that by disposing of a total of five thousand tons of sand, lead, clay, and boron from helicopters that the burning reactor core could be extinguished, but none of the material could actually reach the core. Nearly six hundred pilots were exposed to high levels of radioactivity during their low flights above the reactor.

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[19] Janusz Pudykiewicz, "Numerical Simulation of the Transport of Radioactive Cloud from the Chernobyl Nuclear Accident," *Tellus* (January 1989): 391–412, https://www.researchgate.net/publication/229776477.

[20] Potter, "Soviet Decision-Making for Chernobyl."

With the effect of the wind, radioactive dispersion continued in the north-northwest direction in the atmosphere. The Soviet Air Forces initially adopted a cloud seeding method over an area of 10,000 km² over Belarus, in order to decompose the radioactive particles carried by the clouds moving toward the highly populated areas and trigger sudden condensation and controled fallout. It was recorded that the radioactive clouds also carried over to Norway, moved toward Greenland, and progressed from the north toward eastern Russia. It also reached into central Europe and northern Italy, and impacted Germany and Austria.

As of April 30, concentrations of radioisotopes detected in water basins, agricultural areas, forests, and animals in the region had reached a level of 0.1–0.2 mSV. A "confidential" report indicated that radioactive water from the Chornobyl plant had entered the Dnieper River from the power station's cooling pond, reaching the giant reservoir of Kyiv. A network of artesian wells and pumping stations were rapidly constructed to ensure the city had a fresh water supply, and underwater dams were built to prevent the further spread of radioactive sludge downstream from the riverbeds.

The water gushing out of the cooling water pipes that were destroyed with the impact of the first explosion combined with water overflow on the lower floors resulting from the firemen's intervention on the roof, which reached the cooling water pump's pools located under the reactor floor and caused flooding at the base. The temperature of the smoldering graphite on the reactor floor had exceeded 1,200°C and started to burn through the reactor floor, causing the concrete to melt. It was feared that if this mixture melted through the floor into the pool of water it could create a serious steam explosion that could eject more radioactive material. The pools had to be drained immediately. Volunteer engineers Alexi Ananenko and Valeri Bezpalov and shift supervisor Boris Barazanov entered the highly radioactive water and managed to reach the relief valves and open them to prevent the dreaded explosion.

By May 2, radioactive clouds covered all of Europe except the Iberian Peninsula and reached the UK, then moved across the Balkans and over the Aegean Sea and completely covered the Black Sea. In the south it reached Turkey, and in the east it reached the Caspian Sea, impacting Kazakhstan. In the following days, the clouds headed toward

Alaska via Greenland and to the west coast of the United States via the Pacific Ocean. The clouds covered the Middle East on May 5, and continued its movement in the southeast direction. Spreading across the eastern Mediterranean, while also moving toward eastern and southern Asia, the clouds impacted a significant part of the northern hemisphere.

The danger was not over. The core continued to burn. To reduce the likelihood of the lava flow reaching below the reactor, the decision was made to cool down the base of the building. On May 4, the injection of liquid nitrogen began with the use of oil well drilling equipment. It was estimated that twenty-five tons of liquid nitrogen per day would be required to keep the base at −100°C. This idea was soon dropped. Alternatively, coal miners were deployed to excavate a tunnel below the reactor to make room for a cooling system. The plan was to incorporate a coiled formation of pipes cooled with water and covered on top with a thin, thermally conductive graphite layer, which would quickly cool possible molten spillage on the pipes and encapsulate this graphite layer between layers of concrete—each one meter thick—in order to stabilize the thermal conduction. On June 24, 388 miners from Moscow and the Donbas regions completed the 168-meter-long tunnel. However, it was later realized that the burning in the reactor had stopped on May 10; almost half of the graphite had burned, and after three layers the lavalike material had begun to cool and there was no further melting. Consequently the tunnel was filled with concrete, as a means to strengthen the foundation.

As of June 12, preparations for the exclusion of a 120 km perimeter region with wire fences continued. Over 200,000 students and children from Kyiv and surrounding residential areas were sent to camps in remote areas. It was determined that the number of patients requiring long-term treatment could be around 150,000. It was estimated that there were 129 residential areas, 22,054 courtyards and squares, 46,899 buildings, 5508 kms of roads, 414 km² of fields, and 210 km² of meadows in addition to forest areas that would need to be decontaminated from radioactivity.

The army was mobilized, and a comprehensive liquidating process was carried out for seven months in areas exposed to highly radioactive fallout, with the participation of hundreds of thousands of soldiers. Due to the potential spreading of radioactivity, animals living in the area were culled, fields were plowed, and trees were cut down and buried.

The liquidating process had to be repeated in many areas. Within fifteen months agricultural production resumed in the region, and a limited number of villages were reopened for habitation. The reason for undertaking such an early and perilous effort—especially for an area of marginal agricultural value—rather than leaving it to its natural process was psychological. The Soviet administration sought to prevent societal panic and restore confidence regarding nuclear energy, and even to restart the Chornobyl nuclear reactors.

By July, months of investigations into the causes of the accident had come to a certain stage, and the authorities were held responsible for not having detected and taken the necessary precautions for the operational errors as well as the design failure of the RMBK reactors used in Chornobyl. In line with the KGB report dated July 28, 1986, one day after the Politburo meeting in Moscow, a decision of confidentiality was made along with a broadcast ban on the issues related to the accident that were summarized in twenty-six articles. The first of these articles was about the "disclosure of information about the causes of the accident."

Although broadcasting bans had been relaxed by September 24, 1987, bans on environmental issues caused by the accident, which were summarized in eight articles, continued. In addition to the economic dimensions of the accident, information about the impact on farm animals, forest areas, and natural life; whether the measurements taken around settlements, agricultural areas, and in the air water basins were above the permissible limits; and the results of the analysis of agricultural and animal products were still not disclosed.

SARCOPHAGUS

Months after the explosion, the removal of debris from the roof was incorporated into the agenda. Although the radioactive debris remained largely inside the reactor building, the removal of the nearly one hundred tons of radioactive waste accumulated on the roof was essential to the safe construction of the sarcophagus designed to cover the roof in order to stop the release of radioactive dust into the atmosphere. Initially, remote controlled robots were considered for the removal process. About sixty robots were utilized, but their

electronic control mechanisms were inefficient due to the high levels of radiation, and only 10 percent of the debris could be removed with this method. The replacement of robots by "bio-robots," namely soldiers, was proposed as a solution. Thousands of soldiers were organized for the task, wearing protective clothing and attending the roof only once and working for a maximum of ninety seconds to collect radioactive waste. There were soldiers who ended up going onto the roof not once but five or six times. In the end, the roof was cleaned. In this process involving 3,828 soldiers, the radiation dose each soldier was exposed to was roughly 250 mSv.[21]

Following the cleaning of the roof and its surrounding areas, the construction of the sarcophagus on the debris to curb the spread of radioactive residues and reduce the effect of radioactivity was imperative for the safety of personnel working in other reactors. The design of the sarcophagus project commenced on May 20, and consisted of multiple steps: isolating the surroundings of the reactor building No. 4 with concrete, erecting walls around the perimeter, constructing a shielding wall between the reactors No. 3 and No. 4, covering the turbine hall, closing the roof by constructing carrier and support walls, and establishing ventilation and filtering systems. Four hundred thousand m^3 of concrete and 7,300 tons of metal were used to cover the highly radioactive 740,000 m^3 of debris containing two hundred tons of radioactive lava, thirty tons of radioactive dust and sixteen tons of uranium and plutonium. However, due to high radioactivity, the connections that were meant to be bolted and welded could not be done properly, the robots used for this purpose could not work efficiently, and in the end the isolation process was finished but imperfect. On October 11, 1986, the government commission released a report confirming the reliability and durability of the sarcophagus.[22]

An evaluation made by Soviet scientists on December 22, 1988, estimated that the sarcophagus could only last twenty to thirty years without restoration, as it had been impacted by rainwater that caused corrosion in the carrier columns and beams. Furthermore, the roof was under risk of collapse over time and the radioactive water that seeped to the lower floors could penetrate the debris and reach the soil underneath.

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[21] "Chernobyl."

[22] "Sarcophagus," Chernobyl Gallery, accessed June 30, 2023, http://www.chernobylgallery.com/chernobyl-disaster/sarcophagus/.

In 1992, the Ukranian government organized an international competition under the consultancy of Design Group Partnership (DGP) of Manchester for the renovation of the damaged sarcophagus. The general framework of the technical specification included the New Safe Confinement, a structure that ensured the safety of workers with less exposure to the radioactive environment through various measures such as production at a certain and safe distance as well as an arc-shaped, sufficiently high and slidable structure on rails.

During a meeting that took place in Denver in June 1997, G7 countries, the European Commission, and the Ukrainian government decided to initiate a program to transform the wreckage into a safe zone. With resources provided by more than forty states and the European Bank for Reconstruction and Development, a huge construction project that would withstand environmental conditions for one hundred years and prevent the spread of radioactive debris and aid the removal of the debris could thus be implemented.

Over time, sections of the roof collapsed, and surveys made in the environment indicated that there had been radioactive leakage. Partial repairs were made, but both countries in the region and other European nations feared a new release of radioactivity.

The operators in charge of the management, surveillance, and security of the Chornobyl exclusion zone were only allowed to work for a limited time each day, depending on their rate of exposure to radioactivity, and the shift periods and durations were defined according to their areas of work. Those under the age of eighteen were prohibited from residing within the zone. On December 15, 2000, the last remaining active reactor was also decommissioned, and a new process thus commenced.

Legislation signed by Victor Yuschenko, president of Ukraine, and incorporated into the government program on June 30, 2009, stipulating the securing of reactor No. 4, the clearing out of the region, and the complete dismantling of the Chornobyl power plant by 2065, only came into force on January 1, 2010.

The preproduction process of the arc-shaped structure with an ultimate external length of 165 meters, a height of 110 meters, and a width of 257 meters was produced in Italy, and transported to Chornobyl on eighteen ships and 2,500 trucks. In April 2016, after being

assembled near the site to ensure the safety of the workers, the New Safe Confinement structure was glided onto the sarcophagus using tracks. The final assembly was completed at the end of 2018. The next step was the dismantling and demolition of the radioactive debris using computer-controlled "RoboCranes" set up inside the structure and equipped with interchangeable remote-controlled robotic arms, impact drills, augers, cutters, powerful vacuum systems, and closed-circuit television systems.

THE HIDDEN TRUTH

From a "free world" point of view, the so-called Iron Curtain countries are often criticized for their violation of people's right to information and their careless attitude toward public health. But the situation was perhaps even worse on the other side of the curtain. The concealing of records and nondisclosure of information prevented the real dimensions of the disaster from being revealed to the public even after the Cold War years.[23]

Antinuclear groups questioned the reliability of the World Health Organization (WHO)—an affiliate of the United Nations, but with different missions—and drew attention to a cooperation agreement dated May 28, 1959, between the WHO and the International Atomic Energy Agency, which included a clause stating the right to nondisclosure of certain confidential information if deemed necessary. On the other hand, the confidentiality policies implemented by the state administrations for protecting national economic interests against international competition were received with concern by opposition circles; different institutions were reaching conflicting conclusions using the different data available, perhaps in line with their missions and focus.[24]

The United Nations Chernobyl Forum report published by the WHO on May 1, 2006, predicted that a total of 9,335 people who were exposed to radiation could die over the

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[23] Rosalie Bertell, "Avoidable Tragedy Post-Chernobyl: A Critical Analysis," *Maryland Journal of Humanitarian Medicine* 2, no. 3 (December 2002), chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.nirs.org/wp-content/uploads/reactorwatch/accidents/bertellonchernobyl.pdf.

[24] Zbigniew Jaworowski, "Observations on the Chernobyl Disaster and LNT," *Dose Response* 8, no. 2 (2010): 148–71, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2889503/.

years due to cancer. The analysis showed that a total of 200,000 liquidators who had been involved with the extraction and cleaning activities in the region between 1986–87 and had been exposed to an average radiation dose of 100 mSv, and indicated that 2,350 of these people could die. Also according to the report, out of the 135,000 people living within a 30 km radius from the reactor and who had been exposed to an average dose of 10 mSv before being evacuated, 165 could die; out of the 270,000 people living in other areas who had been exposed to high amounts of radioactivity, an average dose of 50 mSv, 1,660 could die, and out of the 6.8 million people living in other areas exposed to radioactivity, an average dose of 7 mSv, 5,160 could die.[25]

In a similar vein, M. V. Malko's article in Greenpeace International's January 2007 publication investigating the Chornobyl disaster's effects on human health criticized the evaluations of the Chernobyl Forum for being overly optimistic, and predicted that 186,160 of the millions of cancer cases that emerged after the Chornobyl disaster would result in death.[26]

The World Health Organization states that around 4,000 cases of thyroid cancer have been detected—most of them in children—despite the mortality rate being very low. Studies conducted among those who live in the region indicate that among those exposed to relatively low doses of radiation there have been no cases where a decrease in fertility rate or births with anomalies due to radiation have been recorded. The anxiety and fear experienced by the 350,000 people who were forced to evacuate is underscored in studies, and it is noted that mental health cases caused by problems related to poverty and lifestyle changes have been common and in some cases more impactful on society than radiation.[27]

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[25] UN Chernobyl Forum Expert Group "Health," "Health Effects of the Chernobyl Accident and Special Health Care Programmes," May 1, 2006, World Health Organization, https://www.who.int/publications/i/item/9241594179.

[26] "The Health Effects of the Human Victims of Chernobyl Catastrophe: Collection of Scientific Articles, 2006," Greenpeace International, May 17, 2007, https://www.greenpeace.to/greenpeace/?p=708.

[27] "Chernobyl: The True Scale of the Accident," World Health Organization, September 5, 2005, https://www.who.int/news/item/05-09-2005-chernobyl-the-true-scale-of-the-accident#:~:text=A%20total%20of%20up%20to,than%20100%20scientists%20has%20concluded.

According to the records of the United Nations Scientific Committee on the Effects of Atomic Radiation, more than 6,000 cases of thyroid cancer among adolescents and children were recorded up to 2005, and while it was noted that more cases could be encountered over the years, there was no data to prove that there were any other critical disease caused by radiation exposure.

According to the 2015 records of the National Research Center for Radiation Medicine of National Academy of Medical Sciences of Ukraine, 651,453 officers underwent health checks in Ukraine between 2003 and 2007, in addition to 99,693 in Belarus and 157,086 in Russia. Studies done on those exposed to high radiation in the region reveal that mortality rates increased in Ukraine between 1988 and 2012, and those who previously seemed healthy had health problems related to cancer, cardiovascular diseases, and/or disorders related to the nervous system over the years. According to records from 2008, 40,049 of the people who were exposed to high radiation in Belarus had cancer, in addition to 2,833 in Russia as recorded in another study.

On the other hand, the International Atomic Energy Agency claimed that a direct relationship couldn't be established between radiation and cancer and other diseases detected among those exposed to high radiation in the region.[28]

People in many countries throughout Europe were reluctant to trust the statements of the official authorities. Many pregnant women in Denmark, Italy, Greece, and several other countries sought out elective abortions due to a fear of birth anomalies due to radiation risk. The total number of elective abortions performed out of fears of radiation is estimated to be around 200,000.

Risk projections suggest that as of 2006, 1,000 cases of thyroid cancer in addition to 4,000 cases of other cancers in Europe may have been related to the radiation emitted from Chornobyl. According to predictive models, 16,000 cases of thyroid cancer and 25,000 cases of other cancers are expected by 2065.

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[28] "Chernobyl's Legacy: Health, Environmental and Socio-Economic Impacts and Recommendations to the Governments of Belarus, the Russian Federation and Ukraine, The Chernobyl Forum, 2003–5," IAEA, https://www.iaea.org/sites/default/files/chernobyl.pdf.

Nineteen years after the accident and the ensuing radioactive fallout, when the construction of the first nuclear power plant in Turkey was on the agenda, Minister of Health Recep Akdağ declared that scientific studies conducted in the Black Sea region have found no direct relationship between the high concentration of radioactivity in the area following the Chornobyl disaster and the increase of cancer cases, and that the higher number of cancer cases were related to increased cigarette consumption rather than radiation.

A CORDIS report on the Chornobyl accident published by the WHO on April 22, 2006, claimed that the current and expected future seventy-year death toll in the three countries of the former Soviet Union—the Russian Federation, Belarus, and Ukraine—were significantly lower than originally anticipated, and stated that these predictions were consistent with the "official" findings from Turkey.

WILDLIFE

> *"We prefer to believe more in miracles than in the possibility of actually doing something creative with our own two hands. Look at nature. We have to learn from her. Nature is working, cleansing herself, helping us. She behaves more rationally than man. She is striving to restore the original balance, the eternal order of things."*[29]
>
> Svetlana Alexievich, 1997

In March 2019, representatives from research groups examining natural life in Chornobyl met in Portsmouth, UK. Thirty scientists from the United Kingdom, Ireland, France, Belgium, Norway, Spain, and Ukraine shared the findings from their studies on birds, frogs, fish, wasps, worms, bacteria, and rotten leaves in the area.[30]

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[29] Alexievich, *Chernobyl Prayer*, 159.

[30] German Orizaola, "Chernobyl Has Become a Refuge for Wildlife 33 Years after the Explosion," *Conversation*, May 2017, https://theconversation.com/chernobyl-has-become-a-refuge-for-wildlife-33-years-after-the-nuclear-accident-116303.

Throughout the duration of the studies conducted in the region, it was observed that biodiversity was high and that the current radiation levels did not generally have a negative impact on animals and plants. The number of grizzly bears, wildcats, European bows, wild pigs, and Przewalski horses in the area continued to increase. Foxes, wolves, and eagles were returning.[31]

It was noted that animals and plants in the region continued to coexist in a particular balance and order despite certain irregularities noted in some species. In areas where radioactivity was higher, the lifespan of insects had been noted to be shorter, and they were more prone to be impacted by parasites. Although albinism and various other psychological and genetic changes in some bird species and darker skin colors in frogs were documented, it was noted that there wasn't enough data to conclude an interruption in the repair process of natural life in the region. First of all, it was noted that natural life's radiation resistance threshold was much higher than expected or that some organisms could develop their adaptability to eschew the negative effects of radiation. It was stated that natural life in the region was developing in spite of the negative effects of radiation and the absence of humans in the region had benefited several species, especially mammals.

The verdict was that in the medium term, human existence impacted natural life more negatively than a nuclear accident. In an environment devoid of humans, nature could reestablish its own balance. And that was what happened in Chornobyl. While there were different viewpoints and evaluations regarding the development process of wildlife in the region, many scientists agreed tourism in the area should be restricted.[32]

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[31] Mike Wood and Nick Beresford, "The Wildlife of Chernobyl: 30 Years Without Man," *Biologist* 63, no. 2 (2013):16–19, https://thebiologist.rsb.org.uk/biologist-features/out-of-the-ashes.

[32] However, in 2011, Ukraine opened the Chornobyl exclusion zone for tourism. Authorities were adamant that the region was "now safe." Interest in the region was on the rise. In a BBC interview on July 10, 2019, the new president of Ukraine, Volodymyr Zelensky, stated that while Chornobyl is considered a black mark for Ukraine, it was time to change this perception by creating "a green corridor" for tourists, and added that the region's GSM networks were going to be developed. Ren Qi, "Chernobyl Exclusion Zone Will Be a Tourism Magnet," *China Daily Global*, July 12, 2019, https://global.chinadaily.com.cn/a/201907/12/WS5d27dc62a3105895c2e7d0fa.html

> *"Who was here first? Who is stronger and more enduring on the earth: us or them? We could learn a thing or two from the animal kingdom about survival. About how to live too."*[33]
>
> Svetlana Alexievich, 1997

Compared to the "outside," natural life in this exclusion zone was in full bloom. Some researchers supposed that animals had escaped from people to live in this area. An unexpected consequence of the evacuation efforts had been the transformation of this almost postapocalyptic world into a natural habitat for animals. Perhaps being exposed to radiation was the lesser of two evils for animals as opposed to humans who hunted and meddled with the environment and the food chain. The impact of radioactivity on animals was acknowledged but in the long run it wasn't as dangerous as the expansionist species—namely, humans.

With a change of perspective, one can say that Chornobyl was not the scene of destruction, but a place where despite radiation, the lack of humans meant that nature could reveal its ability to reestablish its own equilibrium.

END OF AN ERA

The Chornobyl catastrophe is acknowledged as the worst nuclear accident in history. For the USSR, the cost of the accident was not limited to the immediate environmental damages and human loss but was exacerbated by the wide area in which the post-accident recovery had to be conducted, in addition to the losses due to wasted energy resources, the shattered hopes of a nation, as well as the loss of trust and national pride.

It was thanks to the devoted work of heroes, the labor of hundreds of thousands of people, and the virtually unlimited resources of a great country that the potentially "much bigger" effects of the disaster were prevented. Still, the common view of scientists was that it would take thousands of years for the region to be suitable for human habitation

[33] Alexievich, *Chernobyl Prayer*, 32.

again. Some scientists even estimated that the contaminated area would not be safe for 24,000 years.[34]

Mystery lay inside the sarcophagus, waiting to be discovered.

> *"The nuclear meltdown at Chernobyl twenty years ago this month, even more than my launch of perestroika, was perhaps the real cause of the collapse of the Soviet Union five years later. Indeed, the Chernobyl catastrophe was an historic turning point: there was the era before the disaster, and there is the very different era that has followed."*[35]
>
> Mikhail Gorbachev, 2006

EPILOGUE:

WE HAD BELIEVED IN THE HUMAN MIND

We had believed in the human mind.

We had admired humanity's creative brilliance in the struggle for transforming and adapting nature, we had believed that in the process of dominating nature the productivity of land could be infinitely proliferated with the implementation of capital, labor, and science.[36] However, we had forgotten that we were part of nature, with our flesh, blood, and brains. Since the beginning of the Industrial Revolution—and exponentially so in the last fifty years—the world population has multiplied by ten to reach a total of 8 billion. In line with this and the changes in our habits of consumption and social lives, our energy expenditure has increased twenty times, reaching 160,000 TWh each year. And we had considered this process as our victory against nature.

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[34] Serhii Plokhy, "Spinning Conspiracy Theories Won't Help Us Prevent Another Chernobyl," *Guardian*, August 18, 2019, https://www.theguardian.com/commentisfree/2019/aug/18/spinning-conspiracy-theories-will-not-help-us-prevent-another-chernobyl-nuclear-disaster.

[35] Mikhail Gorbachev, "Turning Point at Chernobyl," *Japan Times*, April 21, 2006, https://www.japantimes.co.jp/opinion/2006/04/21/commentary/world-commentary/turning-point-at-chernobyl/.

[36] Karl Marx and Friedrich Engels, *Marx & Engels on Malthus*, ed. R. L. Meek (London: Lawrence & Wishart, 1953), https://academic.oup.com/ej/article-abstract/65/260/696/5258929.

> *"Human actions threaten more species with global extinction now than ever before. An average of around 25% of species amongst the assessed animal and plant groups are threatened suggesting that around 1 million species are now threatened with extinction, many within decades, unless action is taken to reduce the intensity of drivers of biodiversity loss. Without such action, there will be a further acceleration in the global rate of species extinction, which is already at least tens to hundreds of times higher than it has averaged over the past 10 million years."*[37]

We were talking about an endless desire to dominate the "other," and the process in which humans, having been alienated from their labor, became alienated from nature as well as themselves to eventually destroy their own kind.

Global warming, the melting of the polar ice caps, avian flu, the Kyoto Protocol, SARS, ozone layer depletion . . . We were watching all these developments, but it was as if we were in a theoretical discussion; many of us were gazing at an uncertain future and the agony of others from afar. We didn't question whether we had contributed to the reproduction of this process either.

Now, however, we are inevitably recognizing the fact that our planet is sick and that we are helpless. Our advanced technologies and smart bombs cannot provide a cure. We cannot comprehend the cost of interfering with the natural balance that has evolved over millions of years, and we are horrified.

Those with the loudest voices are still blaming the "other" while some are dreaming of turning this into an "opportunity."[38]

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[37] IPBES Report of the Plenary of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services on the work of its seventh session, presented at IPBES in Paris, April 29–May 4, 2019, https://enb.iisd.org/events/stakeholder-day-and-7th-session-plenary-intergovernmental-platform-biodiversity-and/summary.

[38] "Crisis" and "opportunity" are often perceived as John F. Kennedy used them in 1959. "The explication of the Chinese word for crisis (危机, *wēijī*) as made up of two components signifying danger and opportunity is due partly to wishful thinking, but mainly to a fundamental misunderstanding about how terms are formed in Mandarin and other Sinitic languages." Victor

Yet, the virus knows neither the “other” nor the “farther.”

It is not clear whether humankind will renounce these poorly written and performed theatrics or not, but solidarity of the species stands before us as an option.

H. Mair, cited in Yazarı Malumatfurusorg, “Çince Krizin Fırsat Anlamına Geldiği İddiası,” *Malumatfuruş*, October 27, 2015, malumatfurus.org/cince-krizin-anlami-ve-kose-yazarlarimiz/.