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THE NON-HUMAN WORLD IN THE JAPANESE EARTHQUAKES: FROM THE MYTHICAL CAUSE TO THE REAL VICTIMS

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Japan has always been prone to earthquakes, as the country is located in a zone of high seismic activity known as the Pacific Ring of Fire. The unique Japanese sense of nature, which is also part of national tradition, stands alongside the constant threat of earthquakes from ancient times to the present. This paper will analyze the occurrence of earthquakes in Japan, emphasizing the relationship between nature, non-human world and humanity, and their representations in mythology and folklore, with reference to the most recent devastating earthquake, the Fukushima disaster (2011).

Keywords: *Japan, earthquake, catfish, non-human world, Fukushima disaster*

"The day had been oppressive; and in spite of a rising breeze there was still in the air that sort of heavy heat which, according to the experience of the Japanese peasant, at certain seasons precedes an earthquake. And presently an earthquake came. It was not strong enough to frighten anybody; but Hamaguchi, who had felt hundreds of shocks in his time, thought it was queer—a long, slow, spongy motion. Probably it was but the after-tremor of some immense seismic action very far away. The house crackled and rocked gently several times; then all became still again."
(Hearn 1897:18–19)

INTRODUCTION: ANIMALS AND THEIR DIVINITY IN JAPANESE FOLK TRADITION AND MODERN CULTURE

Japan is a country where the indigenous Shinto religion, closeness to nature and a special bond with the non-human world are deeply interwoven. In Shinto, all natural phenomena are considered as spiritually valuable and should therefore be respected. The elements of nature that impress and inspire awe through their powerful presence and resilience, such as mountains of extraordinary beauty, imposing rock formations, magnificent waterfalls, volcanoes or very old trees, are regarded as divine *(kami)* qualities. Since the times of totemic roots and the alleged founding of the first Japanese state Yamato (third century),[1] powerful families *(uji)* have strived to prove their sacred *kami* origin and consolidate their religious and military authority. Such is the myth of the founder of the Miwa family, whose headquarters were located near Miwa Mountain during the Kofun period (300 BC – 300 AD). The founder of the family is said to have originated from a romantic relationship between the chief craftsman's daughter and her lover, the god Omono Nushi, who is believed to have had the ability to transform himself into a snake (Takeshi 2008:338). Thus, the ancestor of the Miwa family was half kami, half human, but the divine nature of the snake is also confirmed. Wolves were also part of the sacred Shinto tradition in Japan. The collection of poems "Manyōshū," for example, contains poems that refer to the "plains of the large-mouthed pure God" and thus invoke the sacred realm of the wolf. The Japanese term for wolf, *okami*, can be interpreted phonetically as "great deity" (Walker 2015:187–188), which led to traditions of wolf worship in numerous Shinto shrines in Japan.[2] The indigenous people of the Japanese islands, the Ainu, believed they were the ancestors of a wolf and a mythical princess (Walker 2015:187–190).

The harmonious relationship between the Japanese and nature is perhaps reflected in the Japanese attitude towards hunting and killing animals. Until the Meiji period (1868-1912), when the emperors regained their power, the Japanese almost completely abstained from eating meat (with the exception of fish). This attitude was certainly influenced by Buddhism, which suggests vegetarianism. During the Tokugawa

[1] Brown (2008:4) claims that archaeologists today have shed significant light on Japan's "prehistoric" era by discovering tombs of Yamato kings and other powerful lords throughout Japan. These new data, combined with findings from continental sources and historical facts from ancient myths, allow historians to chart the process of centralization of military and economic power under a powerful (Yamato) clan "that emerged in the third century, flourished in the fifth century and declined in the sixth century".

[2] At Mitsumine Shrine in Saitama Prefecture, two wolf sculptures at the entrance serve as guardians of the shrine.

shogunate (1603-1868), the military government *(bakufu)* strictly defined social classes, and the lowest and least respected stratum of society *(burakumin)* consisted of people who were engaged in killing animals and worked as butchers and tanners. They lived on the outskirts of the city and were considered "unclean" according to Shintoism, as contact with blood and bodily fluids was considered "impure."

Even today, mythology, folk tradition, folk literature, and the non-human world are interwoven with daily life in Japan. For example, a mythical creature from Japanese folklore, the *tanuki*,[3] was endowed with supernatural powers and was usually (but not always) portrayed as a prankster. Today, the *tanuki* is an inspiration in pop culture; in the animated film "Pom Poko" (1994, by "Studio Ghibli"), the *tanuki* is one of the main characters, and it is also considered the inspiration for the creation of the famous *Pokémon* mascot. In addition to the Shinto doctrine that the non-human world embodies the nature of the *kami,* animals are also mentioned in Japanese mythology in connection with marriage to zoomorphic deities. For example, the emperor's son took the goddess of the long river Hi (named Hinagahime) as his wife, but she was able to transform into a snake – to the princ's horror (Ō, no Yasumaro 2008:169–170). The myth is characterized by the motif of the broken taboo of seeing, which leads to the separation of the couple (Васић [Vasić] 2022:283). The motif of metamorphosis is also depicted in popular culture. An example of this is "Hakujaden" (created by "Toei Animation Studio"), one of the first Japanese animated films released in the USA in the mid-twentieth century. In the anime, one of the main characters is a princess who can transform into a white serpent. At the end, the romantic relationship continues because the princess decides to renounce her magical powers and her *kami* nature.

In Japanese folk tradition, there is a distinct motif of cat-like creatures, often with demonic or chthonic qualities, that are hostile to humans (Vasić 2023:197–198). Such an attitude towards cats could have its origins in Buddhist views. According to Buddhist tradition, only cats and venomous snakes did not cry when Buddha died. Although they were considered a demonic being, the utilitarian value of cats could not be ignored. It is assumed that cats came to Japan from China in the 6th century and were immediately hired to protect religious scriptures in temples from mice (Vasić 2023:196). As Kimura notes, some domesticated cats were considered rare and special and were kept on a leash, while in the Edo period (1603-1868) silkworm breeders bought paintings of cats because they believed the cats depicted were so strong that they could fend off predators (Kimura 2023). During the Edo period, numerous doll cats and sculptures of cats were gradually produced. It seems that the aspiring craftsmen and merchants considered

[3] A mythical creature that is half dog and half raccoon.

them particularly lucky. In today's Japan, the *maneki-neko* (a small cat statue constantly moving its right claw) is regularly seen in stores and restaurants: a sign for greeting customers (and their money).

In ancient Japanese literature, such as folktales *(mukashibanashi),* animals with anthropomorphic features are often the main characters (a trait shared by folk literature all over the world). In the folktale "Momotaro" ("Peach Boy"), a monkey, a pheasant, and a dog help a boy to defeat demons (Vasić 2016:121). In the folktale "Shita Kiri Suzume" ("The Sparrow Whose Tongue Was Cut Off"), not only can the sparrow speak and cook, but it also helps good people and punishes the greedy (Vasić 2016:180–181). Fish and transformation motifs can be found in the folk tale "Uo Nyobo" ("The Fish Woman"), in which a trout transforms into a girl to thank her savior (Vasić 2016:199).

Even if we speak of earthquakes as natural phenomena,[4] we find explanations in Japanese folklore and mythology for the causes of earthquakes that are connected to the non-human world.

THE NON-HUMAN WORLD AS THE MYTHICAL CAUSE OF THE JAPANESE EARTHQUAKES

Centuries ago, when earthquakes could not yet be explained scientifically, folk tales and myths were created to answer the eternal question "Why do earthquakes happen?" and consequently they were associated with non-humans. The most famous Japanese legend related to earthquakes is the story of the catfish, called *namazu,* on whose back the Japanese islands are said to rest. When the catfish begins to wriggle, the islands shake. The exact age of the catfish legend is not clear, but Motoji states that Toyotomi Hideyoshi (famous Japanese general and military leader, 1537-1598) ordered the monitoring of catfish movements because the 1596 earthquake in Fushimi destroyed his castle (Motoji 2004:13).

[4] In "Tōno Monogatari", a collection of old legends *(densetsu)* or stories from daily life *(seken banashi)*, as defined by the complier, a renowned Japanese folklorist, Yanagita Kunio (1875-1962), there is an account of a distinctive location in the village of Wano - the Jozuka Woods, which is notable for its reputation as being earthquake-proof: "if there is an earthquake, run to Jozuka Woods" (Yanagita 1975:79–80). The legend further states that any disturbance, such as digging in the area, brings an eternal curse upon the offenders, which adds an attribute of holiness and is possibly influenced by Buddhism. However, as Yanagita explains, the term *jozuka* points to the worship of the kami of the boundary and the forest may have been seen as a kind of refuge from danger in ancient times, so people were probably aware of the need to seek shelter beyond inhabited areas in times of earthquakes.

The Japanese catfish *(Silurus Asotus)* lives in rivers and lakes throughout Japan. It usually stays in deep waters and hunts at night. Smits, an American historian, writer and Japanologist, concludes that the legend linking *namazu* to earthquakes was widespread in the late seventeenth century and gained popularity in the following centuries. Earthquakes before 1865 were explained as the movement of trapped yang energy inside the earth in search of a way out (Smits 2012:41–65). According to Smits, who examined images in ancient calendars, motifs of *jishin mushi* ("earthquake insect" or "caterpillar") that looked like snakes or eels were seen on old calendars (e.g. "Ise Goyomi" or "Ise Calendar"), and the legend of the creature can be dated to the late twelfth century (Smits 2012:41–65). The creature was identified as a giant fish, catfish or dragon surrounding the Japanese islands and squeezing them all together. It is possible that the legend later developed into the story of the *namazu*, the giant catfish. Motifs of *namazu* and dragons can be found in the following four-line *renga* (linked-verse poetry genre created in ancient times during poetry competitions), which was written by the famous Japanese poet Matsuo Basho (1644-1694):

"Jakumetsu no kai fukitareru hatsu arashi
(The shell of eternal piece rise with the wind of the first storm)

Ishi ko zumenaru Yamamoto no kumo
(The clouds of the mountain covered by stones)

Dai jishin tsuzuite ryū ya noboruran
(As the great earthquake continues, the dragon rises)

Nagajūjō no namazu narikeri."
(Ten feet long namazu it was.)[5]

(Musha 1955:52–54)

The first two lines of the *haiku* could refer to the ancient belief that tremors are actually thunder under the earth (Smits 2012:41–45).

Until the seventeenth century, when the military clans gained power over Japan, the capital of the state was Kyoto, near Lake Biwa (the largest lake in Japan). In mythology, an island in Lake Biwa, Chikubushima, was believed to be the place where the Shinto deity of

[5] Translated by the author.

music, happiness and wealth, Benzaiten, descended from the sky. Snake-like creatures and yellow catfish that lived in the lake were the ancestors of the deity and the protectors of the island. They delivered messages about impending earthquakes, storms, diseases, and other disasters and sometimes even took on human form. The sanctity of the island was confirmed when Emperor Shomu (701-756) ordered the construction of a Buddhist temple on Chikubushima in the eighth century, which is an example of the incipient fusion of Buddhism and Shintoism. Chikubushima is northeast of Kyoto, while Kashima Shrine is northeast of Edo. This direction was considered unfavorable because it was believed that demons could enter the city through *kimon* (a gate in the northeast), which is the reason why shrines and temples have been built in the place of *kimon* (Sansom 1974:118). The *shogun* (military leader) who moved the capital to Edo in the early seventeenth century followed this tradition, and so the Kashima Shrine became the protector of Edo city. Many wooden prints from the Edo period (1603-1868) depict a Kashima deity holding a stone over *namazu* and controlling the movement of fish, showing that Kashima Shrine played a role in protecting the capital, Edo, from earthquakes.

ANIMALS AS HARBINGERS OF DISASTERS

The Japanese connection to nature is so strong that they believe that animals can predict great misfortune and warn people of coming disasters (perhaps due to the long history of natural disasters in Japan). As Tributsch explains, "the catfish is generally a peaceful fish that becomes unusually active before an earthquake occurs" (Tributsch 1982:39). Furthermore, Japanese catfish live in deep waters and hunt at night, so it is not surprising that a large number of these fish swimming on the surface of the water was a surprising sight.

There are anecdotes about people who noticed the unusual behavior of fish before an earthquake. On the night before the great earthquake in Tokyo on November 11, 1855, a fisherman fishing for eels noticed that they bunched and fluttered on the surface of the water, making fishing easy and fast. However, the fisherman gave up his task and returned home, remembering the old legend that such actions are a sign of an impending earthquake. This decision supposedly saved the fisherman's house and family (Tributsch 1982:39). In reports on fish behavior shortly before the great Tokyo earthquake on August 31, 1923 (in which 70,000 people died), an official from the Ministry of Education is mentioned claiming to have seen catfish jumping out of the lake nervously and very excitedly the day before the earthquake. Large catches of fish were also documented near Kochi two weeks before the Nankaido earthquake (magnitude 8.1) on December 21, 1946 (Tributsch 1982:39–41).

In 1932, two scientists at the Asamushi Biological Station (S. Hatai and N. Abe) studied catfish by setting up an aquarium that simulated the natural environment with lots of mud. They concluded that fish become sensitive 6-8 hours before an earthquake if the epicenter is close enough (regardless of the magnitude of the earthquake). According to the scientists' research, the fish were able to predict earthquakes in 80% of cases. They also showed that the sensitivity of the fish is weaker when they are not in their natural environment (Hatai and Abe 1932:375–378).

Catfish were not the only animals that behaved strangely before earthquakes, as the unexpected behavior of other sea species was also observed. As Tributsch notes (Tributsch 1982:43–50), many sea urchins and eels swam near the shore and sea snakes were seen in rivers one day before the great Sanriku earthquake of 1896; a very rare eel-like deep-sea fish *(Nemichthys Avocett)* was found floating near the coast of Hayama a few days before the 1923 Kanto earthquake; on the morning of the Great Kanto Earthquake of 1923, even freshwater fish such as carp were seen floating exhausted on the surface of the lake as if they lacked oxygen, and many fish died in the rivers around Yokohama, apparently from the same cause; dolphins left their habitat a few days before the 1964 Niigata earthquake. "When a sardine cloud appears, an earthquake occurs." ("Iwashi kumo ga deru to jishin ga okiru") is a proverb among fishermen from northern Japan, alluding to the fact that large schools of sardines are a possible sign of an earthquake.

Moreover, not only sea animals have keen senses, but land animals as well, as Japanese tradition explains. There is an old Japanese belief that rats bring stability and peace to a home. Rats and mice often lived in traditional wooden houses. Tributsch wrote about a restaurant in Nagoya called the "House of Rats" where rats roamed freely. Allegedly, the owner of the restaurant complained about the sudden disappearance of all the rats on the evening of October 27, 1891, and warned the neighbors of this ominous omen. The next day, an earthquake (later called the Nobi earthquake) with a magnitude of 7.9 occurred, with an epicenter of about 40km from Nagoya. The disappearance of the rats on the evening of the Nobi earthquake was followed by the disappearance of sparrows and pigeons, while on the eve of the earthquake the cries of cats were very intense (Tributsch 1982:47–49). In Japanese folklore, there is a belief that cats transform into powerful spirits after death (Vasić 2023) and so their noise can herald an earthquake. Pheasants can predict earthquakes as well, as Japanase folklore claims. Although they are clumsy fliers, they have a keen sense of vibrations and sensitive hearing, which Omori practically proved with a chronometer (Omori 1930:1–5).

As discussed earlier, animals have often been portrayed as harbingers of earthquakes in Japanese tradition, but little is known about the effects of natural disasters on animals. After the 1894 earthquake in Tokyo and on the Japanese Pacific coast,

local residents discovered many strange dead fish on the shores, that even the most experienced fishermen had never come across. It is assumed that these fish, driven by fear, changed their habitat and suddenly came to the surface, but had difficulty adapting to the daylight conditions (Tributsch 1982:41). The fish have now become victims of natural disasters.

PAST AND PRESENT: THE NON-HUMAN WORLD AS THE BEARER OF THE TERRIBLE CONSEQUENCES OF DISASTERS TODAY

In today's Japan, tradition and technology still coexist inseparably. "The Japan Times" reports that in March 2010 a large snake-like fish, *Regalecus Glesne*, was spotted in Toyama on the west coast of Japan (Yamamoto 2010). In Japanese, the fish is called *ryūgū no tsukai* which translates as "palace of the dragon king" and reflects its mythical and divine associations. As stated in the article, "fish that live near the seabed are more sensitive to the movement of active faults than those that are near the surface," leading to speculation that the emergence of such fish could actually indicate more significant ground movements. Not surprisingly, people linked the sudden appearance of the oarfish to the great Tōhoku-Kantō Great Earthquake disaster in 2011.

Today's science blames Japan's location for the frequent earthquakes. The Pacific Ring of Fire, on which the Japanese islands lie, is a series of volcanoes and earthquake centers along the edges of the Pacific Ocean. About 90% of all earthquakes on our planet occur along the Ring of Fire, and 75% of all active volcanoes on Earth are located in this belt (Evers 2024). The tectonic plates in the Ring fit together like puzzle pieces, but they often move apart, collide and slide under each other, causing deep trenches through which hot magma reaches the Earth's surface. Mount Fuji is the highest and most famous mountain in Japan (Evers 2024) and an active volcano in the Ring of Fire, located at a triple junction where three tectonic plates meet (the Amur Plate, the Okhotsk Plate and the Philippine Plate). It last erupted in 1707.

In the last three decades alone, there have been four major earthquakes in Japan that have caused great damage to humanity. The following are the data on the number of casualties. In 1995, a magnitude 7 earthquake struck the Kobe region, killing more than 5,500 people and causing 210,000 houses to collapse or disappear completely (Torikai 2005). The earthquake that struck the central prefecture of Niigata in 2004 was also devastating: 40 people died instantly and around 6,000 people were seriously wounded (Li et al. 2007:1255). More than 300 buildings (especially traditional Japanese houses made of wood) were severely damaged in an earthquake that struck the western part

of the Fukuoka region in 2005 (Jafar-Gandomi 2017). However, the most devastating disaster, not only in Japan but in the whole world, is undoubtedly the Tōhoku-Kantō Great earthquake in 2011. But humans are not the only victims, and we must not forget the non-human casualties.

The Tōhoku-Kantō Great disaster of March 11, 2011, as a terrible example of the suffering of the non-human world, was the result of an earthquake, a tsunami and a nuclear catastrophe. The disaster was triggered by a magnitude 9.0 earthquake with an epicenter 30 km below the Pacific Ocean floor and 130 km east-southeast of the Oshika Peninsula and the city of Sendai in Miyagi Province. The quake generated 10-meter-high waves that quickly reached the Japanese coasts, sweeping thousands of victims into the floodwaters. The tremors were even felt in Russia (Kamchatka), China (Beijing) and Taiwan (Rafferty and Pletcher 2024).

The earthquake took the lives of 20,000 people, more than 2,500 are still officially missing and a further 6,000 people were injured; around 470,000 people were evacuated from their homes and 1,000 people are still living in emergency shelters (Reconstruction Agency 2023). Although the evacuation orders have been lifted and most areas of Miyagi and Fukushima provinces have been declared safe, there are still around 27,000 evacuees (as of February 2023), according to the Reconstruction Agency of Japan.

The tsunami that hit the Fukushima nuclear power plants on March 11, 2011, caused a complete blackout, a hydrogen explosion and a radiation leak at Nuclear Power Plant One *(Daiichi)*.[6] Radiation levels were detected in some local food and water sources and the government issued warnings (Rafferty and Pletcher 2024). At the end of March, seawater near the *Daiichi* power plant was found to be contaminated with high levels of radioactive iodine-131. A few days after the disaster, high levels of iodine-131 were detected in tap water in Tokyo and the Kanto region (Novikova 2023). When Natalia Novikova, a researcher from the Faculty of Science and Technology in Keio University, investigated locally, cases of thyroid cancer in children appeared, which puzzled the doctors as this type of disease was not typical for children. Although iodine-131 gradually dissipates, the ingestion of contaminated water can have long-term effects on human health. Even today, parents (whose children lived in the Kanto region during the earthquake) and doctors organize regular ultrasound examinations of their children's thyroid glands (Novikova 2023).

There are still areas in Fukushima Prefecture that are marked as "difficult to return"

[6] In mid-April 2011, the International Atomic Energy Agency classified the severity of the nuclear crisis at Fukushima Daiichi as level 7, putting the Fukushima disaster in the same category as Chernobyl in 1986. In addition, despite all the reconstruction measures at the nuclear power plants in Fukushima, contaminated water leaked several times afterwards (Rafferty and Pletcher 2024).

and to which access is restricted, but they account for only about 2.4% of the total area of Fukushima (Reconstruction Agency 2023). Decontamination work to remove radioactive materials has been completed throughout the prefecture, with the exception of the areas mentioned. Nevertheless, some families (especially those with children) are still not returning to their homes out of fear for their safety and health. The town of Namie, located 20 kilometers from the Fukushima nuclear power plant, is nicknamed a "ghost town" because less than 7% of the population returned to the town after the disaster (Statistics Bureau Japan, "City Population", 2020).

The consequences of the last major earthquake in Japan in Fukushima (2011) had physical and psychological effects on the people and animals living in their area. The Cabinet Office of the Japanese government announced in 2010 that 34.3% of Japanese households own some kind of pet, and the number of pets has risen steadily since the 1990s (Kajiwara 2020). As in many other countries, pets play an important role in the everyday lives of the Japanese. Inokuma explains that the first dogs came to Japan from Korea and the Nansei Islands (between Kyushu and Taiwan) after the Jomon period (13000 – 300 BC) and that the first dogs to be kept as pets in the homes of wealthy aristocrats in the Middle Ages were Japanese Chins, a breed of dog with long hair and small body size (Inokuma 2001:32).

Dogs were initially valued as hunting companions and protectors of the household. However, in urban areas today, pets are apparently no longer kept for their protective abilities, but for psychological reasons, as they help people feel less lonely, especially in today's Japan where alienation is present. In 2018, the Pet Association estimated the number of pet dogs in Japan at around 8.9 million, while the number of cats is estimated at 9.6 million (JPFA 2018:18).

Despite such an attitude towards animals, this empathy does not seem to have come into play in times of catastrophe. The rescue workers who immediately arrived in the areas affected by the Tōhoku-Kantō Great earthquake only rescued people, not animals. Pets and farm animals were left to survive on their own. In April 2011, the government closed the zone within a 20-kilometer radius of the Fukushima nuclear power plant and even erected barriers. Many animal owners were unable to return and feed their animals. As Kajiwara explains, farm animals, with the exception of cows, were not rescued at all (Kajiwara 2020). Immediately after the earthquake, 90,000 people temporarily lived in collective shelters, while around 10,000 people reported that they had left dogs and other pets behind during the evacuation in order to find shelter themselves (AWI 2011). Animals were not allowed into the collective shelters for hygienic reasons, so the Fukushima refugees had no choice but to leave their beloved pets behind.

The number of farm animals abandoned amounted to more than one million,

including 630,000 chickens, 30,000 pigs and 3,500 cattle (AWI 2011). In the following years, desperate farmers and livestock owners decided to confront the radiation hazard and returned to the contaminated areas to care for their animals. After the introduction of a strict ban on entering the area on April22, 2011, around eighty thousand residents were no longer allowed to return to the radiation zone (AWI 2011). When temporary access was granted in May, returnees rushed to check on their pets, and reports indicate that most of the animals left behind starved to death or were eaten by other creatures. Several months after the Tōhoku-Kantō Great earthquake, the Japanese government allowed animals in pain to be euthanized.

The tsunami hit the north-eastern region of Japan so hard that cars were stuck in walls, debris was carried for miles through rice paddies and entire families drowned on the spot. As a "Reuters" article from June 2011 states, Ms. Taeko Nose was a woman who had lost her daughter in the disaster and was suffering from severe depression. Her condition showed no improvement until she learned from the orphaned dog and cat rescue teams that one of her dogs had been found alive and well. Both the doctors and Ms. Taeko Nose concluded that being reunited with her dog had a very positive effect on her mental health and trauma healing process (Kitayama 2011). Numerous stories have been published on the Internet about pets who instinctively found their owners again and gave them much comfort. Such is the story published in "Japan Today" in March 2011, of Shane, a male Akita who was outdoors when the tsunami struck and his caretaker could not find him. A few days later, the exhausted (but still alive) dog found his owner, who was staying at a local school that had been converted into a homeless shelter. Their reunion was an extraordinary spectacle, as the newspapers reported (Fruno 2011). All these stories remind us of the story of the famous Japanese dog Hachiko made into film, as he faithfully waited for his owner until his last days; the Hachiko statue still stands in Shibuya Station.

When discussing the mental state of the survivors of the Tōhoku-Kantō Great earthquake, the physical and mental health of the animals that survived the disaster must also be mentioned. Many animals left behind in the radioactive areas led a semi-wild life on their own. Studies of dogs that were affected by the disaster and later rescued indicate that the dogs are still under stress even after several months of care and shelter. Dogs from Fukushima that survived the disaster were not aggressive towards strangers, but they were unable to bond with their caregivers and were mostly difficult to train. Dogs affected by the disaster had cortisol levels five to ten times higher than normal. It is obvious that dogs suffered from PTSD (Pappas 2012).

In 2013, the Ministry of the Environment published the "Disaster Preparedness Guideline for Humans and Pets," the first of its kind in Japan, which provides advice

on how to deal with animals in the event of a disaster. It is not an official law, but local authorities should follow the guidelines, which recommend applying the principle of *doko hinan* ("evacuation with pets"). The guidelines were revised after the Kumamoto earthquake in 2016, and the Japanese government now allows pets to stay in certain pet-friendly shelters (Japanese Ministry of the Environment 2018:13).

Today, many fish and communities of invertebrates have returned to the Sendai reef (100km north of the Fukushima nuclear power plant), but scientists are still not sure about the impact of the earthquake on the ecosystem. The absence of parasites seems to indicate that the ecosystem is still recovering and is not as rich as it used to be (Van Paridon 2020). Biologist Osama Miura of Kochi University conducted research in the muddy soils of Sendai Bay and took a year to find just one snail (Van Paridon 2020). The snail parasites, trematodes, took even longer to return. They first live in snails, then in marine animals, and finally they are eaten by large animals, whereupon the parasites can multiply. The reproduction of snail parasites is therefore a lengthy process, but one that reflects the stability and evolution of the food chain. As ecologist Kevin Lafferty claims "the diversity of hosts leads to a variety of parasites because the diversity of hosts provides the opportunity to complete different life cycles" (Van Paridon 2020). The Japanese government has ordered the construction of strong walls on the Miyagi cost to protect residents in case of possible future disasters, but this measure could disrupt the balance in nature and affect the animal species that survived the tsunami; I believe that this issue should be discussed further.

The monstrous Tōhoku-Kantō Great earthquake has not only affected the lives of the Japanese, but the consequences of the disaster spread across the entire Pacific. The Midway Atoll sanctuary in the Midway Islands suffered losses of over 110,000 Laysan albatross chicks (Berger 2011). In addition, thousands of Bonin Petrels were buried alive, and thousands of fish were washed ashore and suffocated on the Eastern Islands (Goldman 2011). Beaches in the Galapagos Islands, a World Heritage Site, were flooded after the 2011 earthquake, and the San Cristobal Islands, where many marine iguanas nest, were affected by high waves, leading to a decline in the number of marine iguanas in the area (Goldman 2011).

One more disturbing occurrence is the migration of species. Although it may not seem threatening at first glance, the allocation of species to different regions can harm local ecosystems. The cold *(oyashio)* and warm *(kuroshio)* ocean currents meet on the east coast of Japan and travel across the Pacific to the west coast of North America. After the 2011 tsunami, marine life was caught in the currents, and the North Pacific Current carried them as far as Hawaii, the south and central coasts of Alaska and the coast of California. Inorganic materials such as glass fibres, plastics and metals formed durable

"rafts" to which the sea creatures clung. This enabled them to travel great distances, carried by the ocean currents. Marine species from the Japanese coasts (around 300 species of invertebrates and fish) reached the coasts of North America in 2017 (Chown 2017). Scientists are not yet sure how the new arrivals on the American coasts could affect the native food chain.

CONCLUSION: THE NON-HUMAN WORLD AS A DIVINE CREATOR, FROM THE CAUSE TO THE VICTIM OF NATURAL DISASTERS

Since ancient times, the Japanese have developed a strong symbiotic relationship with the non-human world, animals, and nature. According to mythology, the Japanese islands were created by gods who imbued every atom of nature with divine characteristics. Therefore, the non-human world has divine qualities in itself, the beauty of creation and growth, but also the power to cause natural disasters. This trait is still part of Japanese culture today and is perhaps the source of the strength the Japanese possess to endure natural disasters and accept the world as it is. The non-human world, which was cherished and treated with respect and believed to cause earthquakes in the past, is now the victim of natural disasters and human errors. Although the love for the macrocosm is always alive and intense, the modern world brings us nuclear power plants and radioactive waste that threaten to endanger humanity and the nature we love so much. Will Japan (and the world) succeed in saving its unpolluted landscapes and undisturbed habitats? That remains to be seen.

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Ne-ljudski svijet u japanskim potresima: od mitološkoga uzroka do stvarnih žrtava

Vesna Kuraica

Japan je oduvijek podložan potresima, budući da se zemlja nalazi u zoni visoke seizmičke aktivnosti poznate kao Pacifički vatreni prsten. Jedinstveni japanski osjećaj prema prirodi, koji je dio nacionalne tradicije, stoji uz bok stalnoj prijetnji potresima od davnina do danas. Ovaj će rad analizirati pojavu potresa u Japanu prikazanu u mitologiji i folkloru, fokusirajući se na prirodu, čovječanstvo i svijet izvan ljudskoga, s osvrtom na najnoviji razorni potres i nuklearnu katastrofu u Fukušimi (2011).

Ključne riječi: *Japan, potres, riba som, svijet izvan ljudskoga, nuklearna katastrofa u Fukušimi*

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