Why the Aral Sea Could Not Be Saved?
Socialistic Irrationalities and General 'Misfits'

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Preface

The Aral Sea is a landlocked saline lake in Central Asia, located across the border between the two former Soviet countries, Kazakhstan and Uzbekistan. The territory of its basin extends not only to five Central Asian states of the former U.S.S.R., but also to Afghanistan and even Iran, if the basin of the Karakum canal is considered. The Aral Sea is located in the arid zone in the depth of the Eurasian Continent with average annual precipitations less than 200 mm inside the lake and 260 mm per year in the entire basin. The Ustyurt plateau, a stark clay-rocky desert, spreads in the west, the Kzylkum desert in the east, and the Karakum desert in the south-west of the Aral Sea. The two large rivers, the Amu Darya and the Syr Darya, are flowing into it. The Pamir and the Tian Shan mountains stretch out in the upper basins, moistened by glacial and snow meltwater. The Aral Sea had been the fourth largest inland water body in the past, but now shrunk its surface up to one fifth or one sixth. The water balance is mostly determined by an inflow volume from the rivers and an amount of evaporation from the surface of the water body, which reflects upon the surface area and the water quantity of the Aral Sea. The irrigation development for cotton and rice and the irrational water usage in the middle reach of the basin extremely decreased an amount of water inflows, which finally caused the shrinkage of the Aral Sea. We observe no fundamental change of the irrational water usage in the basin since the independence of the five Central Asian states. Consistently, anthropogenic factors have brought down the Aral Sea problems.

As Arkady Levitanus, a Soviet geographer, mentioned in 1992, it is possible to list the Aral Sea crisis rightly among "the worst ecological disasters of the 20th century" [Levitanus 1992: 193]. The water level initially began to drop down little by little from 1960, but at an accelerated pace from the second half of the 1970s. The Aral Sea split off into two parts (the northern Small Aral and the southern Large Aral) at the Berg Strait in 1989. The Large Aral was further separated into the eastern and the western parts in 2005. The Western Aral was eventually broken apart into north and south in 2006. The salinity had risen in accordance with the shrinkage of the Aral Sea, which resulted in catastrophic damages to fish species that lived in brackish water, and devastated ports and fishery villages around the Sea. Furthermore, sandstorms had eaten up the health of locals remained there, which frequently blew up from the exposed former seabed. Sands and drinking waters were contaminated with harmful chemical entities, since drainage waters from irrigated lands flew into the

Aral Sea through the Amu Darya and the Syr Darya, from which locals take waters for everyday use.

Soviet intellectuals started to proclaim the necessity to save the Aral Sea from the beginning of the 1970s, which almost ended up nothing. During the final days of the Soviet Union, it came to be thought impossible to restore the Sea to the state before 1960. As late as in 2006, Kazakhstan government eventually accomplished partial restoration of the Small Aral, constructing the Kok-Aral dyke across the Berg Strait under the financial support of the World Bank. Now the salinity of the Small Aral dropped down to the level that some aboriginal species of fishes could survive. Fishery also began to revive. However, it took such a long time to implement "sole" effective measure after the Soviet authorities recognized the problems. As discussed below, the reasons of this delay can be summarized to several factors: the limitation of "reflexive modernization" in the Soviet Union, the gradualness and creepingness, and the spatial multilayeredness of the Aral Sea crisis. Social and economic turmoil before and after the collapse of the Soviet Union played a crucial role to worsen the situation in the basin, which became "transboundary," and the problems much more complexified after the collapse of the Soviet Union.

First, this paper will analyze what sort of concrete measures have been designed and implemented to save the Aral Sea from the 1970s until today, and further inductively consider what specific socialistic or Soviet factors and what common factors in global water and environmental governance have hampered the Soviet party-government structures from implementing effective schemes to restore the Aral Sea. Ecological degradations had occurred and accumulated creepingly since 1960, but accelerated its pace and turned into the disaster from the end of the 1970s. Describing who intended to save which aspect of the crisis for what purpose, the author finally shed light on the difficulty to settle the multidimensional, multilayered, long-standing and creeping environmental and ecological crisis.

1. The modern history of saving the Aral Sea

1.1. Argument in favor of the death of the Aral Sea and "mythology" of the Siberian water diversion (until the middle of the 1980s)

There existed an opinion even during the Tsarist era that the saline Aral Sea was economically invaluable and played solely a negative role as an enormous evaporator, through which a huge amount of water had been lost every year. Some Russian intellectuals argued that the total flow of the Syr Darya and the Amu Darya should be consumed for irrigation before it flashed into the Aral Sea. This sort of thinking had been mainstream among Soviet intellectuals after the October Revolution even until the end of the 1960s. In May 1966, the Central Committee Plenum of the CPSU brought forth promotion of irrigation and amelioration development, including for cotton and rice in

Central Asia, which further reinforced this view. A Soviet hydrologist insisted in 1969 that irrigation in the Aral Sea basin would make one hundred times more profits than fishery made [Геллер 1969: 6-7]. Zaurkhan Ermakhanov, the director of the Aral branch of the Kazakh Institute of Fishery, told the author that about two thousand fishermen had engaged in fishery in 1960s and 1970s, when there remained a huge number of fishes in brackish waters of the Small Aral.[1] In fact, it must be said that the capacity of the employment absorption in fishery in the Aral Sea was quite small, even if being included workers associated with fishery. These economic factors implicitly and explicitly gave approval among Soviet bureaucrats and intellectuals to the death of the Aral Sea. The Siberian water diversion from the Ob'-Irtysh river basin was thought to be one of the redistribution projects of water resources in the Soviet Union and the most promising countermeasure against the drying-up of the Aral Sea and the water deficiency in Central Asia in the future. From the midst of the 1970s, the Soviet government started to consider seriously the realization of the Siberian water diversion project concomitantly with the Northern Rivers diversion project from the Pechora, Kama and other river basin to the Volga River basin.

Twenty seven cubic kilometers of water per year was planned to be diverted from the Ob'-Irtysh river basin to the south through the artificial canal of two thousand seven hundred kilometers. This project was considered primarily to compensate irrigation water in Central Asia which would be completely run out owing to the expansion of irrigated plots in the near future. In fact, its main target was not to save the Aral Sea. The reasons could be accounted by the forecast of farmland shortage in the Aral Sea basin in consequence of rapid population growth in the region [Gustafson 1981: 77]. Nonetheless, a number of ameliorators and party-state leaders shared the opinion that "it would be an easy solution of the [Aral Sea] problems, if we promptly implement the diversion of some water flows of Siberian rivers to the Aral Sea basin" [Глазовский 1990b: 91]. As Chida [地田 2009] argued, they considered the shrinkage of the Aral Sea and the Siberian water diversion as a continuum, describing a prosperous future: the expansion of irrigation would develop economy of Central Asian republics, and there was a solution to solve water scarcity problem, raised by water scarcity in the future. Mikhall Glazovskii, a famous Soviet zoologist, called this mood as "euphoria" [Глазовский 1990b: 91], which indicated that the Siberian water diversion project became a "myth" among Soviet citizens, leading to the comprehensive solution of water problems in the Aral Sea basin.

The Aral Sea accelerated its pace of shrinkage during the 1970s, when Central Asia had been challenged by recurrent dry years. In addition, these water shortages overlapped the impoundment of the huge dams (Nurek and Toktogul) in the upper stream of the Amu Darya and the Syr Darya, which worsened water situations in the middle and lower reaches during the vegetation periods. The situation in the Syr Darya with less total flows was more troublesome. Under such circum-

[1] Personal correspondence (E-mail) with Mr. Zaurkhan Ermakhanov on 13 May 2013.

stances, the Central Asian leaders did lobbying actively to the Kremlin. As a result, Aleksei Kosygin, the chairman of the U.S.S.R. Council of Ministers, declared at the twenty fifth Party Congress in 1976 to embark on academic researches about the feasibility of the Siberian water diversion project in the tenth five year plan. Although the Aral Sea was diminishing at an accelerated pace at that time, the Soviet government decided only the start of the "academic research," which meant that Moscow still had not endorsed the realization of the project. To be more accurate, the Brezhnev regime could not politically endorse the project, since it did have no confidence of its feasibility and negative influence on the environment.

Actually, Soviet scientists had various opinions and visions about the Siberian water diversion. Some of them approached to this project quite cautiously, among whom existed some big-name academicians like Innokentii Gerasimov, the director of the Institute of Geography, U.S.S.R. Academy of Sciences [地田 2012: 59]. From the beginning of the 1980s, the "village prose" Russian writers began to express their objection to the project, which galvanized public opinion among Soviet (mainly Russian) citizens. The nuclear meltdown at Chernobyl' eventually boosted up environmental consciousness among them, which triggered the adoption of the joint decision of the C.P.S.U. Central Committee and the Soviet government about the abolition of the project in august 1986. However, this does not mean that the "myth" of the diversion of Siberian waters completely broke away.

Some other alternative solutions were proposed to save the Aral Sea. Soviet ameliorators implemented some measures to enhance irrigation efficiency in new construction sites of water facilities in Central Asia, which actually gave some positive effects [Micklin 1992: 95-96]. Admitting the importance of the Aral Sea in shipment and fishery for local people, well-known Soviet hydrologists, Mikhail L'vovich and Irina Tsigel'naia, suggested saving only the northern Small Aral and the western and deeper part of the Large Aral by constructing a huge north-south dyke, which would divide the Aral Sea into some parts [Львович и Цигельная 1978]. As discussed below, these options were directly related to the measures designed during and after perestroika.

The local administration had taken some concrete measures for fishermen during the 1970s. Aitbai Kosherbaev, a former mayor of the Aralsk district and the responsible official of the construction of the Kok-Aral dyke, was born in Klandy town on the north-west shore of the Large Aral, who told the author that locals began to perceive recession of the coastline in 1963.[2] Fish catches began to drop rapidly from 1965. The thin and shallow strait on the west of the Kok-Aral Island, named the Auz-Kok-Aral Strait, dried up in 1968, which transformed the former island into a peninsula, connected to the Eurasian Continent [Aladin *et al.* 1995: 19]. The Avan Fish Factory was closed in 1975 and two fishery villages (Avan and Kok-Aral) on the former island were demolished. Population of both villages moved to Akbasty village, which became a sole settlement there. Almost at the same

[2] Interview with Mr. Aitbai Kosherbaev in Kzyl-Orda city on 4 February 2013.

time, the Aralsk Fish Combine began to organize seasonal fishery works for local fishermen in various inland water bodies in Kazakhstan.[3] The Aral Sea lost its values for brackish fishery until the end of the 1970s. The Aral branch of the Kazakh Institute of Fishery sought to acclimatize some salt-tolerant fish species from 1979 and eventually succeeded in acclimating flounders from the Sea of Azov [Ermakhanov *et al.* 2012: 6-7].

These local measures were not fundamental solutions and did not improve the livelihood of locals. On the contrary, family members of fishermen, mainly women and children, were always left behind the villages around the Aral Sea, who sharply worsened their health owing to frequent saline sandblastings and poor drinking waters. Many started to migrate into other regions of Kazakhstan and Uzbekistan. Nevertheless, the Soviet government only started their academic works on the Siberian water diversion, although the project itself had already been "mythicized" among Central Asians for a long time. The ameliorators in Central Asia, especially in Uzbekistan, often petitioned the outright realization of the construction of the Sibaral channel to the central party-state organs.[4]

1.2. *Perestroika* and the rethinking of remedies to save the Aral Sea (1985-1991)

Gorbachev's *glasnost'* policy triggered public debates about the environmental problems in the Soviet Union. The Siberian water diversion plan, once seen as a panacea, was abandoned by support of the public opinion, which further hastened public and intellectual discussions about a variety of measures to mitigate the environmental degradations in and around the Aral Sea.

Kakimbek Salykov, the first secretary of the Karakalpak *obkom*, was the very first local high-rank official, who overtly appealed the necessity to finally settle the Aral Sea problems and help victims of the catastrophe.[5] His voice resulted in the organization of the U.S.S.R. governmental commission, headed by Yurii Izrael', the chairman of the All-Union State Committee of Hydrology and Meteorology, which adopted the final resolution with recommendations about the future measures. The measures in the document were in fact overly optimistic and unrealistic to implement on time. For example, the document recommended following measures: the completion of safe drinking water supply for local people around the Aral Sea through pipes until 1995; the "utilization of desalting plants" until 1990 for water supply in small settlements up to 35 thousand cubic meters per day; the full provision for contemporary sewage system in all the cities, district capitals, large

[3] Interview with Mr. Togyz Akhmetov, a former fisherman, in Akbasty village on 30 January 2013.

[4] The author found several archival documents, petitionary letters about the Sibaral project, written by Uzbekistan scholars and ameliorators during the second half of the 1970s, in the Russian State Archive of Contemporary History (RGANI).

[5] What is interesting, Salykov is a Kazakh by nationality who was born in Kostanai province in the northern Kazakhstan.

settlements in the region until 1995 and so on [Современное состояние 1988: 16]. Of course, these measures should have enhanced health and sanitary standers in the region, if having been realized accurately and on time. However, the document was a sole recommendation without any obligatory instruction and an enumeration of measures, lacking financial grounds and feasibility analysis, which made it something on an armchair. Even so, they were of great importance because of their "social" direction, which meant that the Soviet government publicly approved of the Aral Sea crisis as not only "natural" or "ecological," but also "socio-economic" problems. In addition, admitting it impossible to restore the Aral Sea to the level of 1960, the governmental commission demanded the Ministry of Melioration and Water Resources to "completely cease to introduce new irrigated lands from the end of 1991" and put it in the "Scheme of rational water use and conservation of water-land resources in the Aral Sea basin until 2010," which had to be worked out by the ministry [Современное состояние 1988: 13].

Meanwhile, the canceled project of the Siberian water diversion continued to have its appealing power to Central Asian leaders and intellectuals, who continuously required the unhesitating realization of the project [Dorman 1991: 51-52]. Ribert G. Darst Jr. [1988: 229] even mentioned, "the debate over the projects only intensified following [the] resolution" in 1986. As a result, Gorbachev finally agreed to restart academic researches and feasibility study about the Siberian water diversion in January 1988, responding to the voices from Central Asia [Dorman 1991: 50; Micklin 1992: 106]. Five leaders of the Central Asian republics held a meeting in Alma-Ata in June 1990, which adopted the resolution with an appeal for effective actions to the Aral Sea crisis and the resurrection of the Siberian water diversion project [Micklin 1992: 106]. At the same time, the project itself became one element of political bargaining of the Central Asia republics to the center, while in the progress of *perestroika* the national republics declared their sovereignty and began to make political actions and statements independently.

Besides, several other solutions were suggested, which should be accompanied by large-scale nature remodeling. The ideas quite well corresponded with that of the Siberian water diversion. One of them was the east-west dyke construction project along the southern edge of the Large Aral, proposed by Viktor Dukhovnyi, a prominent ameliorator and hydraulic engineer, the head of the Central Asian Research Institute of Irrigation in Tashkent at that time[6]. Uzbeks realized a part of this idea after the independence. Dukhovnyi argued that maximally ten cubic kilometers of additional volume of water per year could be ensured if ameliorators entirely subjected measures to enhance water efficiency in irrigated plots in the Aral Sea basin. According to him, it is impossible not only to save the Aral Sea as a whole, but also to maintain the status quo with this volume (thirty

[6] Dukhovnyi is still an incumbent at the Scientific Information Center of the Interstate Coordination Water Commission of the Central Asia as the director and holds a great deal of national, regional and international influence on water policies in the Aral Sea basin. He speaks in English fluently.

cubic kilometers per year were necessary at least). Therefore, his suggestion was targeted to the delta area of the Amu Darya by constructing a two hundred twenty kilometers long dyke and one large and some middle-scaled lakes, into which would be accumulated drained waters (8.7 cubic kilometers per year) from irrigated plots through manmade canals. The resurrection of the delta area was critically important for locals, many of whom were fishermen and workers in the canning factory. For them, the revival of water bodies in the delta area would bring back sustainable fishery. For others, it meant the revival of muskrats for fur manufacture in creeks and swamps and meadows for pastoralism. Additionally, it should mitigate environmental and health degradations by sandstorms, a part of which should settle down into artificially controlled lakes [Духовный и Разаков 1988]. However, Dukhovnyi did not show an answer whether drainage waters, contaminated with pesticides and chemical fertilizers, were safe for the reproduction of the delta of the Amu Darya, its vegetation and fishes. Except for Dukhovnyi's plan, the construction of the Trans-Ustyurt canal from the Caspian Sea and the artificial intensification of precipitation by so-called "cloud seeding" were suggested, which did not seriously considered [Глазовский 1990a: 97].

In contrast to these countermeasures accompanied by large-scaled nature remodeling, the Institute of Geography, the U.S.S.R. Academy of Sciences, searched for a breakthrough to the Aral Sea crisis by thorough rationalization of water usage in the basin and the change of agricultural production to less water-consumptive crops. Responding to the above-mentioned "recommendation" by the U.S.S.R. governmental commission, the Institute drew up a comprehensive concept about the further measures to save the Aral Sea in the spring of 1991, titled "Basic concept of conservation and restoration of the Aral Sea, normalization of the environmental, sanitary, medical, biological and socio-economic situation in the Aral Sea" (hereinafter, the "basic concept"). First, the "basic concept" defined the surrounding area of the Aral Sea as the "disastrous zone (зона бедствия)" [Основные положения 1991: 9]. Further, it argued, "the economy of the region became catastrophic not because of the desiccation of the Aral Sea, but adversely the catastrophe around the Aral Sea is the inevitable result of the deep crisis of the regional economy. Therefore, if we concentrate our efforts solely on saving the Aral Sea, it is doomed to fail in advance, because the entire region is in dire and miserable ecological and economic situation" [Основные положения 1991: 12]. The "basic concept" put forward following two-step solutions to the catastrophe: (1) the solution of socio-ecological problems and the creation of necessary conditions of livelihoods for locals and (2) the restoration of the ecological balance of the region [Основные положения 1991: 11]. Eventually, the official concept about the Aral Sea crisis demonstrated the recognition that the social and health difficulties of local people around the Aral Sea got priority over the ecological and economic problems in the whole basin. Concretely, it proposed following emergent measures for local people up to 1995: reduction of spraying of pesticides and the search for alternative methods to protect crops; supply of an adequate amount of foods with abundant nutrition value to local residents around the Sea; expan-

sion of medical services in the region; design and implementation of clean water supply for locals. Furthermore, it also suggested several water-saving measures: reduction of cotton fields due to gradual conversion from cotton to chemical and synthetic fibers in textile industry; decrease of rice fields; abandonment of marginalized croplands; enhancement of water efficiency in irrigation channels up to 0.8; introduction of water fee for irrigation usage. All of these measures should have made it possible to economize 30.5 cubic kilometers per year in 1995 and 46.5 cubic kilometers in 2010, enabling to keep the altitude of the Aral Sea surface around 40 to 41 meters. The water level was 53.4 meters in 1960. That is, the Soviet geographers had already given up complete resurrection of the Aral Sea. The "basic concept" did not deny the possibility to realize the Siberian water diversion, the construction of dykes in the delta area and artificial rainmaking in the future, but thought it secondary solutions, which could be implemented only if the effectiveness of these measures would be testified scientifically and economically more than enough [Основные положения 1991: 13-21]. What is interesting, the "basic concept" did not tolerate supplying waters to the delta areas and proposed that all surplus waters should be directed to the Aral Sea itself.

The very first international cooperation to save the Aral Sea began during the *perestroika*. In 1989, Mustafa Tolba, the president of United Nations Environmental Program (UNEP), held a meeting with Mikhail Gorbachev in Moscow and suggested the engagement of UNEP in the Aral Sea problems [Аладин 2012: 208-209]. Finally, in January 1990 the Soviet government and UNEP signed the agreement to start a joint project. UNEP proposed to apply the scheme of the program for the environmentally sound management of inland waters (EMINWA), which had already been conducted in the Zambezi river basin in southern Africa. In the framework of this scheme, UNEP makes an environmental management plan jointly with states, located in a particular basin. At first, international and local specialists jointly conduct comprehensive researches to draw up a "diagnostic report," on the basis of which they make an "action plan" for future cooperative basin management. The project started in February 1990 to draft a "diagnostic report." The Institute of Geography in Moscow became an implementing agency because of lack of any independent regional coordination mechanism of conflicting interests among the national republics, including environmental ones [中山 1994: 465]. Some expeditions around the Aral Sea were organized with the participation of Soviet and foreign journalists, started by the "Aral-88" expedition in August 1988 [Резниченко 1992]. It was also this period, when the first generation of non-governmental organizations in the Soviet Union began to get contact with western NGOs [Weinthal 2002: 113-114].

In this manner, it was during the *perestroika*, when the "omnipotent" myth of the Siberian water diversion gradually tumbled down and the Soviet intellectuals began to seek more steady and fundamental approaches to the Aral Sea "catastrophe," considering that most immediate priority should be given to the lives of local people. At the same time, they proposed to save only some parts of the Aral Sea, not the whole former water body. However, the existence of the Soviet Union was a

promise to realize all these solutions, proposed during the *perestroika* including some international cooperative measures. The U.S.S.R. ended its history in December 1991, which compelled the newly independent five Central Asian states to start afresh from the beginning.

1.3. Agreements and disruptions among the newly independent Central Asian countries (1992-2000)

Arkady Levitanus wrote in 1992, "the [basic] concept for the first time presents a realistic and bright outlook for tomorrow being a blueprint for concrete measures" [Levitunus 1992: 259]. However, the "basic concept" was never implemented and just abandoned. The independent Russian Federation quit distributing subsidies to the former national republics and the coordination of conflicting interests among them. The UNEP project, implemented jointly with the Institute of Geography in Moscow ended solely with the formulation of the "diagnostic report" [中山 1999: 259]. The independent states began to ask foreign aids to the international community, which should have substituted budgets and subsidies from Moscow during the Soviet time. And it became impossible for the Central Asian states to solve the Aral Sea problems for themselves due to the lack of budgets and the conflicts of interests among the five states in the basin, which made the crisis be "politicized."

As soon as the Soviet Union disintegrated, the newly independent Central Asian governments asked the World Bank to give financial and other supports to them for solution of the Aral Sea crisis. It was a matter of course that the World Bank did not provide supports in a while. The World Bank requested the newly independent states to create the institutional and organizational framework of the regional cooperation and coordination around the Aral Sea crisis and water management in the basin, which would substitute the Moscow's coordinating functions during the Soviet time. Concerning the on-site basin water management of the two large rivers, the Basin Water Organization "Amu Darya" and "Syr Darya" had already been established in 1987, the structures of which the independent states took over. In February 1992, the summit of five Central Asian leaders in Almaty decided to create the Interstate Commission for Water Coordination of Central Asia (ICWC), relegating the seasonal distribution of water resources in the basin. Subsequently, the two top-level meetings in Tashkent and Kzyl-Orda resolved to organize the Interstate Council for Addressing the Aral Sea Crisis (ICAS) and the International Fund for Saving the Aral Sea (IFAS) in January and March 1993. The former was intended to make basin management policies and review projects to save the Aral Sea. The latter was a sort of the investment agency to the concrete projects on the basis of deposits from the state budgets of the participatory countries. Furthermore, the Interstate Commission for Socioeconomic Development and Scientific, Technical and Ecological Cooperation was established in 1994 (reorganized to the Interstate Commission on Sustainable Development (ICSD)), which was aimed to the environmental and desertification problems in Central Asia. In February 1997, ICAS was integrated into IFAS. In this manner, the institutional making of the regional coop-

eration agencies went quite smoothly and expeditiously.

Then, the concrete measures to save the Aral Sea will be reviewed during the final decade of the twentieth century. Generally speaking, the Central Asian states had an interest only to maintain the "status quo" of the Aral Sea crisis and the agricultural and water policy. After the independence, row cottons were only source for acquisition of foreign currency, for which Uzbekistan and Turkmenistan were desperate. In addition, many of farmers in both countries engaged in cotton growing through irrigation, the abandonment of which was capable of provoking social unrests among peasants. Therefore, the leaders of both countries were quite reluctant to fundamentally transform the agricultural structure [Weinthal 2002: 148, 174]. Furthermore, the government of both countries kept much cheaper the price of row cotton, procured from peasants, than its international market price. Uzbekistan introduced two-tier exchange rates (official and commercial) and further appropriated the differences in rates into the national treasury. In Turkmenistan, the official rate was set up excessively high, which was far from that of the real "black" rate. Thus, cotton growing became a way of exploitation from peasants and cotton became a kind of "rent" in both countries [野部 2012: 152-154]. Though, both counties also tried to increase food productions, especially, wheat, which consumed several times less irrigation waters than cotton and rice. In fact, the dissemination areas of wheat overtook those of cotton in the end of the 1990s in Uzbekistan [野部 2012: 151]. And, the economic turmoil in the former Soviet countries during the 1990s made it difficult for farmers to use plenty of fertilizers and pesticides as during the Soviet time, which ironically gave positive effects on water quality of the rivers [Karimov *et al.* 2005: 95].

The World Bank orchestrated the drawing up of the "Aral Sea Basin Program Phase 1 (ASBP-1)" in 1993, the very first regional cooperation program in Central Asia, which was finally adopted by the five Central Asian states at the summit in Nukus in January 1994. This program was consisted of the following four main components: (1) stabilization of ecological situation in the Aral Sea basin; (2) restoration of the disaster area around the Aral Sea; (3) improvement of transboundary water management in the basin; (4) capacity building of the regional organizations in planning and realization of the Program. Further, seven more sub-components of the program were formulated, which, however, did not touch upon the transformation of agricultural structure in Central Asia [Weinthal 2002: 143]. In June 1994, the donor's meeting held in Paris gave approval of the implementation of nineteen feasibility studies [真瀬ほか 1996: 1029]. Significantly, the ASBP-1 assumed, "While restoring the Aral Sea to its former size and productivity will not be possible, it is feasible to recreate much of the lost value by restoring wetlands in the deltas of the Amu and Syr Darya Rivers" [World Bank 2004: 21]. Here, we can see a substantial impact of the Soviet ameliorators, who succeeded in building up close contacts with international donors. The World Bank gave approval of financing neither the Siberian water diversion project nor the water intake from the Caspian Sea, although the Central Asian authorities desired them earnestly and urgently [Weinthal 2002: 147].

Later on, differentiated remedies would be elaborated in the Small Aral and the Syr Darya delta on the one hand, and in the Large Aral and the Amu Darya delta on the other.

In 1998, the World Bank began the regional project "Water and Environmental Management Project" with IFAS as the implementing agency. It seemed a breakthrough idea to mitigate the Aral Sea crisis "regionally" on cooperation with the regional organization like IFAS, in which individual states took part. However, the entire project ended with a miserable consequence of the "unsatisfactory" rating. Above all, the project set reckless goals. For example, fifteen percent of water withdrawals for irrigation in the whole basin must have been reduced within the project period by the significant improvement of water-use efficiency, which appeared to be solely utopian. As a result of the installation of the project office in Tashkent, where the headquarter of IFAS was located at that time, political wills and intentions of the Uzbekistan government were highly reflected on the contents and the personnel matters of the project, although the project itself was "regional" [World Bank 2004: 1-2, 8]. Plenty of troubles in fund management during the project were the most critical for the worst rating. The final assessment report of the project indicated, "Expenditure statements were not kept current, making day-to-day financial management as well as future planning extremely difficult" [World Bank 2004: 15]. In addition, "project financial management was extremely cumbersome, rarely timely and not transparent," which compelled World Bank missions to spend many times to argue financial management issues [World Bank 2004: 11, 16]. The flow of funds naturally became very complicated, because World Bank had to pump financial resources to sub-components of the project in all five countries through the project office and IFAS, located in Tashkent, Uzbekistan. These factors engendered the risk of corruption, although the report did not mention it explicitly.

Notwithstanding, it is not to say that ASBP-1 and the first regional project had no meaning. Some project components really gained successes like the enhancement of dyke security and the wetland restoration, which led to the additional individual projects. Especially, the successful restoration of Lake Sudoch'e on the left bank of the lower Amu Darya and the revival of wetland vegetation became a model case for the future measures [World Bank 2004: 11]. At the same time, parties involved became vividly aware of the efficiency of country projects rather than regional projects.

The World Bank project was top-down and lacked the on-site perspective on the disaster area around the Aral Sea. Western and local NGOs, supported by United Nations Development Program (UNDP) and United States Agency for International Development (USAID), infilled this niche. However, the governments of the newly independent states did not welcome this sort of grassroots movements and sometimes tried to cut down the contacts between NGOs and foreign donors by confronting social organizations (or "would-be" NGOs), manufactured by the governments, against them. The newly created regional organizations stayed away from these local NGOs [Weinthal 2002: 164-170]. It was just impossible to bring a drastic improvement of drinking water and peoples'

health around the Aral Sea solely by the activities of NGOs, when the socio-economic situation of the region deteriorated severely after the independence and the transformation of economic systems. During the chaotic period after the independence, it was certain that Central Asian NGOs also engaged in "rent seeking" actions, which compelled us to cautiously review the behaviors and roles of NGOs in the region.

In contrast, locals took consistent measures for the restoration of the Small Aral. Navigation became impossible across the Berg Strait due to the drawdown of the Aral Sea until the end of the 1970s. Artificial canal was dredged for shipping traffic. After the Aral Sea split into two water bodies in 1989, the dredged canal across the former Berg Strait became a natural drain from the Small Aral to the Large Aral, since the altitude of the Large Aral was lower than that of the Small Aral. What is worse, the dredged canal might be directly connected to the Syr Darya River owing to erosional effects, since the former Berg Strait is located almost adjacent to its river mouth. As a result, the shrinkage speed of the Small Aral would be accelerated, and influent water into the Large Aral might solely dry off. This was the worst scenario [Аладин и Плотников 2008: 150]. In July 1992, the first dyke was constructed across the Berg Strait by military, but collapsed almost immediately after the completion. Then, in August, the local administration mobilized local residents as workforces and reconstructed the earth dam without a sluice [Аладин 2012: 214-215]. The "people's" construction was achieved in concordance with the advice of Nikolai Aladin, a zoologist, who had performed seasonal monitoring of zooplanktons in the Aral Sea for a long time. Seirbek Shaukhamanov, the governor of the Kzyl-Orda Province, and Begali Kayupov, the head of the Aralsk District, accepted his advice. This simple earth dam sometimes partially broke down, and finally collapsed in April 1999 [Аладинс и Плотников 2008: 151]. Notwithstanding, thanks to this simple dyke, the lowering of the Small Aral stopped, and some revival of fishes (mainly flounders) and fishery were observed [Ermakhanov *et al.* 2012: 7].

In this way, the regional cooperation around the Aral Sea problems as well as the ASBP-1 did not progress smoothly. What is even worse, it became more and more intense the confrontation between the upstream states (Kyrgyzstan and Tajikistan) and the lower countries (Kazakhstan and Uzbekistan). The former intended to cover electricity demands during winter with hydraulic power generation, but the stable volume of irrigation waters were necessary for the latter during summer. The conflict situation had gotten worse and worse, but did not lead to a full-fledged struggle including military one, thanks to the creation of the regional dialogue mechanism. In addition, the network of Soviet ameliorators and hydraulic engineers in five countries contributed to stabilize the situation and maintain the status quo even after the independence [ダダバエフ 2008: 27]. However, international and regional cooperation could not hammer out any effective solution to resolve the Aral Sea catastrophe and settle the upstream-downstream disputes due to the socio-economic crisis during the 1990s. Furthermore, it took so much time for foreign donors and international organizations even to

achieve mutual understanding about their aid policy and project schemes with individual states. Much more times were necessary to finish project making, implement concrete projects and make significant results [北村 2007: 388]. At the same time, the Large Aral continued to diminish its surface area and the livelihood of people around the Aral Sea got worse. Maybe, all of these were "birth pangs" for Central Asian states, which were forced to simultaneously address nation-building, transformation of economic systems and creation of the framework of the regional cooperation. However, lost time had gone forever.

1.4. Revival of the Small Aral and after (from 2001)

It was only since the beginning of the twenty first century, when the socio-economic chaos after the collapse of the U.S.S.R. quieted down, and Kazakhstan and Uzbekistan became able to take effective measures to improve the livelihood of local people around the Aral Sea. They gradually accomplished mutual understanding and cooperative relationship with foreign donors, which promoted the accumulation of indispensable information for project-making.

In 2001, the World Bank started a loan project with the government of Kazakhstan in the lower reach of the Syr Darya River, titled "Syr Darya Control and Northern Aral Sea Project (Phase 1)." In the framework of this project, they achieved the construction of the up-to-date Kok-Aral Dyke across the Berg Strait in autumn 2005, equipped with flow adjustability of the Small Aral through the sluices. The Small Aral accomplished the storage of the planned volume of water until spring 2006. As a result, the saline concentration of the Small Aral got lower and fishes came back. Now fishery in the Small Aral is reviving. Except for the dyke construction, the World Bank project targeted comprehensive measures to improve water use efficiency in the lower reach of the Syr Darya River, including rehabilitation of the Chardara Dam at the border with Uzbekistan, and improvement of the hydraulic control of the lower Syr Darya, infrastructure development of fishery and former fishing villages [World Bank 2011: 4-5]. Now the "phase 2" project is under consideration, which plans to construct one more dyke in the Small Aral across the mouth of the Saryshganak Bay and one artificial channel from the delta area of the Syr Darya up to the northern part of the bay. These "nature transformation" measures bring waters back up to the shorefront of Aralsk City on the northeastern edge of the Small Aral, which certainly has quite a big symbolic meaning for Kazakhstan in a sense that many citizens can witness the revival of the Small Aral with their own eyes. However, local fishermen express an opposite view against the second project, whose fishing grounds are located out of the future Saryshganak Dam. Water conveyance to the Saryshganak decreases water inflow into the rest of the Small Aral, which could be increase saline level and give negative effects on fishes. Rather, they desire to reconstruct and heighten the Kok-Aral Dam in order to widen and deepen the Small Aral and increase fish resources. The website of the World Bank

shows that the "phase 2" project has been "dropped" recently in June 2013[7]. We have to behold if this decision is final break off between the Kazakhstan government and the World Bank or some temporal pause.

In the lower Amu Darya, ameliorators took various measures in the delta area from construction of drainage canals and water reservoirs to restoration of delta wetlands and tugai forests. The representative office of IFAS in Uzbekistan implemented the project "Lake Restoration in the Amu Darya Delta (Phase 1)" and constructed nine water reservoirs from 2000 to 2002. Several dykes were also built, equipped with sluices, which gave them a function to control water volume. However, waters often do not reach to the dams in dry years and high waters sometimes break dykes in wet years. The World Bank only recently closed the project "Drainage, Irrigation & Wetlands Improvement Project (Phase 1)," in which drainage channels and collectors were constructed and systematized. In this way, Uzbekistan is now realizing what Dukhovnyi designed during the *perestroika*. The author has little information about the situation of people's livelihood in Karakalpakstan today. Now UNDP is implementing the project "Sustaining Livelihoods Affected by the Aral Sea Disaster," funded by Japanese government.

Since the beginning of the twentieth first century, the energy-water disputes escalated between the states in the upper reach (Kyrgyzstan and Tajikistan) and the downstream of the Aral Sea basin (Kazakhstan and Uzbekistan), which seems not to be settled in near future. Even so, the five countries in the basin have not shut down their doors of dialogue, and the regional cooperation mechanism is still functioning, though not fully. The ASBP-2 was approved in 2002 and the ASBP-3 in 2010. Now the United Nations European Economic Commission (UNECE) replaces the coordinating role of UNEP and the World Bank in the past.

2. Then, why the Aral Sea could not be saved?

As written above, a multiple of actors worked up a variety of measures to save the Aral Sea, but they could bring only some of them into life with significant delay, although Soviet scholars and naturalists quite actively had argued the necessity to take measures to save the Aral Sea fitly since the beginning of the 1970s. As a result, the Small Aral revived imperfectly, but the Large Aral is now moribund and its water is extremely saline (more than 100 mg/l), where only several species of planktons can survive. Then, why the Aral Sea could not be saved? And why the Soviet Union could not take measures on time? Why did it take such a long time to do something effective to save the Aral Sea and to mitigate the socio-economic-ecological crisis? In this section, the author tries to answer these questions through the lens of "environmental governance (EG)."

[7] The World Bank homepage (checked by the author on 2 August 2013):
http://www.worldbank.org/projects/search?lang=en&searchTerm=&countr ycode_exact=KZ

Before going into these subjects, the author provides some characteristics of the Aral Sea crisis as a "disaster" or "catastrophe." Firstly, the Aral Sea crisis was "multidimensional." As Oliver-Smith mentioned, "disasters focus in uncommon intensity the widest possible variety of intersecting and interpenetrating processes and events of social, environmental, cultural, political, physical, and technological natures" [Oliver-Smith 2002: 25]. This picture of "catastrophe" also can be applied to the Aral Sea crisis.

In addition, the Aral Sea crisis is characterized by its "longevity" from 1960 until today. Initially, the environmental change went on quite slowly, and abruptly began deteriorating at an accelerated pace during the 1970s. Michael Glantz defined this sort of gradually exacerbating environmental problems, which are invisible at the initial stage, as the "creeping environmental problems (CEP)" [Glantz 1999]. Normally, CEPs are firstly perceived by locals, around whom gradual environmental degradations occur. However, it proceed so slowly that local residents cannot realize the potential harmfulness for human-beings and the possibility for these changes to transform radically into catastrophic situations and ecological crisis, which, in turn, further prevent scholars and officials in the capital as well as in localities from recognizing them as something necessary to take measures urgently [Glantz 1999: 6-7]. These "multidimensionality," "longevity" and "creepingness" were particularly important to understand the nature of the Aral Sea problems.

Then, how can we answer to the above-mentioned questions? Firstly, the author describes "general" causes, distinguished from the specific "socialistic" or "Soviet" factors. The author applies Oran Young's "misfit/mismatch" concept to the Aral Sea problems[8]. The "fit" indicates the compatibility of institutions and regimes to "biogeophysical system" in nature. If "not" compatible, then, the terms "misfit" or "mismatch" are used. Young [2002: Chapter 3] proposed three variables, which determine the difficulty to close the gaps between "ecosystem properties" and "institutional attributes": "imperfect knowledge," "institutional constraints" and "rent-seeking behavior." Young [2008: 24] further typified the "misfit" concept into "temporal misfits" and "functional misfits" as critical issues in environmental governance.

According to Young [2008:24], "work efficiency is typically not good on issues, which proceed slowly." At the same time, vice versa is also true. Institutional reforms and adaptations often cannot catch up with the speed of environmental changes as we can clearly see in the cases of nuclear disasters and earthquakes. These are "temporal misfits." As for the Aral Sea crisis, initial environmental changes had proceeded gradually and creepingly, which suddenly burst into a disaster in the end of the 1970s, when desiccated former lake sediments started to fly apart and seriously devastated the health of local people, and depletion of brackish fishery resources resulted in mass migration of fishermen's families either temporarily or permanently. At the first stage of the environ-

[8] Oran Young is a specialist about the international regime of environmental governance from the perspective of neoinstitutionalism.

mental changes around the Aral Sea, many thought that it would be in the distant future, when the Siberian water diversion would be necessary. However, when the Aral Sea crisis began to bring down catastrophic results, then it became apparent that it would be impossible to save the Aral Sea and restore the ecology and economy around it to the level of 1960 even by the immediate realization of the Sibaral channel. Eventually, the Soviet Union officially recognized the Aral Sea crisis as a "disaster" and "catastrophe" only in the second half of the 1980s after the beginning of the *perestroika*. Unfortunately, the *perestroika* did not give a few substantial results in taking practical measures to mitigate the Aral Sea crisis until the disintegration of the Soviet Union. After the independence, newly independent states desired foreign donors and international organizations to substitute and take a role of Moscow during the Soviet time as distributor of financial and technical assistances and coordinator of regional matters. They fulfilled the desire of Central Asian states to some extent. However, the bureaucracy of the newly independent countries had to fritter an enormous amount of time on institutional making, research and study, and informational gathering and supplement, which must well coincide with the criteria and demands of foreign donors and international organizations. These requirements were preconditions for mutual trust and effective project making. Furthermore, the socio-economic turmoil after the independence triggered rent-seeking behavior among the bureaucrats, and actually financial supports from donors became "rents," which also disturbed smooth project formation and implementation.

"Functional misfits" indicate difficulties in adjustment of activities among organs both horizontally and vertically. Chida [地田 2013: 303-310] discussed the difficulties in horizontal coordination between vertically segmented administrative organs, taking the water resources management in the Ili-Balkhash basin in Kazakhstan as an example. As for the Aral Sea basin, it was terribly complicated to make adjustments of activities between organizations, since a plenty of stakeholders of water resources existed not only in the five national republics, but also in Moscow. Coordination of interests and activities between stakeholders in the basin became more intricate after the collapse of the Soviet Union, as the Aral Sea basin became "transboundary." It seemed that the regional organizations like ICWC, IFAS and ICSD could have facilitated vertical coordination, which was not the case, however. In reality, these "regional" organizations became de facto "national" agencies according to the location of headquarters, particularly, in personnel matters, which further increased the complexity of vertical coordination between the regional organizations and the nation states.

As Michael Glantz [1999: 6-7] mentioned, "Most environmental changes are surrounded by scientific uncertainties." Especially, discrepancies and clashes of opinions tend to occur due to scientific uncertainties at the initial stage of the environmental changes [マクニールほか 1991: 204]. The pros and cons around the Siberian water diversion were the most typical. A number of scholars with a variety of academic disciplines gave diversified forecasts about the future of the Aral Sea and the visions on the Sibaral channel. The geographical scales and ranges, over which actors

around the Aral Sea problems had jurisdictions, were also diverse. A wide variety of actors have exhibited opportunistic behavior, selectively utilizing scientific research results for their own sake, which made it quite difficult for Moscow to coordinate various opinions. In this manner, scientific uncertainty (according to Oran Young, "imperfect knowledge") and functional misfits were closely interconnected, which, in turn, brought additional time losses and extension of hazards.

Further, it is possible to articulate some "spatial misfits" to the Aral Sea crisis, which Oran Young did not mention. This "spatial misfits" mean that the plurality of levels and scales of space related to causes, results and solutions of a certain disaster, disturbs the effective institutional making concerning the disaster. Spaces with a variety of geographical scales overlap in some cases and are separate in other instances. As for the Aral Sea crisis, irrigation plots in the whole basin created the causes of the catastrophe, but its calamitous results for the lives of people were notably observed in the fishery villages around the very Sea. The spatial setting related to the Aral Sea crisis does not coincide with that of the Siberian water diversion project, and the space targeted by the "transformation of nature" concept encompassed not only the arid areas in Central Asia, but the entire Soviet Union. In addition, actors of various geographical scales formulated and appealed a plenty of measures to save the Aral Sea. Financial, institutional and personnel deficiencies made it extremely difficult to implement a multiple of measures at once, which covered a variety of geographical scales. The Aral Sea basin became transboundary and international after the independence of the five nation-states in Central Asia, which complicated corporation mechanism and coordination of measures. In the Aral Sea crisis, the "spatial misfits" have unalterably prevented from implementing effective remedies to the Aral Sea catastrophe from the Soviet time until now.

Then, it will be mentioned the factors, unique to the Soviet Union. Firstly, the "asymmetry of information" became maximized between the center, the republics and localities. In the Soviet Union, it was a sole channel for rank and files to write letters to the party-state organs in order to express their opinions. However, it depended on the will of the party-state authorities whether citizens' opinions, petitions and accusations were taken into account or not in the policy-making processes. The Aral Sea problems were closely related to cotton production, one of the strategic sectors of the U.S.S.R., the topic of which was difficult to discuss openly. Normally, the authorities solely neglected them or pretended as if they knew nothing about the crisis, but locals actually suffered from the results of the crisis. This sort of "asymmetry of information" encouraged significant delay in making and taking effective measures against the Aral Sea crisis.

It does not mean that Soviet scholars and scientists had no interest about the future of the Aral Sea. On the contrary, they actively studied the Aral Sea and its basin, and gave prognostic reviews about its future prospects. However, as Nikita Kuznetsov argued in 1991, "Today, we see that geographical and ecological data and science itself have been disregarded. This tendency became apparent already in the 1950s and the beginning of the 1960s, when irrigation areas have solely in-

creased year-to-year, and uncirculated water withdrawal from rivers was permitted for irrigation purpose" [小野 1993: 22]. This "disrespect" of scientists by the Soviet authorities was also one element of the "asymmetry of information," which after all prevented the Soviet high-rank officials from acknowledging the risk of the Aral Sea crisis, possibly turning into the irreversible catastrophe in a near future.

The "temporal misfits" between "planning" and "science" created time-lags between the expansion of irrigated plots and the design of concrete countermeasures against the Aral Sea crisis. Quite often, governmental officials tend to embark on setting remedies only after scientists acquire enough empirical data about the environmental degradations, that is, after the creeping environmental problems rise up to the surface and begin bringing catastrophic consequences. It was not an easy task for scientists to foresee anthropogenic environmental changes and their feedbacks to human life. The forecasts are always uncertain, as mentioned above. Generally, it takes so much time to design measures to mitigate environmental degradations and scientifically verify its efficiency and feasibility, which is the least compatible with short-term developmental plans. In the Soviet context, it was an absolute obligation for citizens to achieve five year and annual plans, including those of extensive reclamations of irrigation plots. Therefore, ameliorators and peasantries set themselves to cultivate newly irrigated lands for any sake to fulfill short-term plans without any consideration about the contents and consequences of reclamations. Marginal lands had been also cultivated for the sake of achieving plans. It was a structural deficiency in the Soviet Union that planners and policy-makers always advanced their developmental prospects, whether or not scientists properly gave forecasts about the negative feedbacks from the anthropogenic nature remodeling, and designed more or less "effective" measures against them. This sort of "temporal mismatches" also can be seen in the western countries, but more negatively gave impacts on the environment in the Soviet Union because the economic plans were much more "rigid" and "absolute" and ideologically related.

Finally, the attitude toward science and technology by the Brezhnev regime further complicated the situation around the Aral Sea problems. The Soviet political system is characterized by the democratic centralism, which legitimated the top-down and vertical commands and controls. In addition, the Communist Party played a leading role in the state. The party decisions were regarded as the equivalent of people's will. Therefore, the party decisions became immediately obligatory and penetrated into all the related organizations. This "swiftness" of policy-making in the Soviet Union enabled the leaders of the time to carry out large-scaled socialistic modernization policies in an expeditious way. For this reason, Iosif Stalin was able to start Stalin's Plan for Transformation of Nature without any advance feasibility study. And Nikita Khrushchev could enforce newly immigrated colonizers to apply the uniformed method of farming in the Virgin Land Campaign. However, these fast-and-sloppy projects eventually appeared to be unsuccessful. Leonid Brezhnev learned well the failures in the past. As a result, his leadership entrusted scientists and engineers with scientific and

technological matters. As for measures to save the Aral Sea the Brezhnev leadership always took a stance not to politically endorse the Siberian water diversion project until scientists and engineers fully evidenced its efficiency and feasibility. This sort of verification was never accomplished because scientists held a wide variety of data and perspectives about the project. This was an ironical result of the "reflexive modernization" of the Soviet type.

Conclusion

The author periodically assembled a variety of measures to save the Aral Sea, and searched for reasons why it took so much time to take concrete measures against the Aral Sea crisis that the Aral Sea could not be saved. Three types of "misfits" disturbed smooth designing and implementation of measures, which can be characterized as the "general" challenges to be overcome in the global environmental governance. That is, the catastrophe analogous to the Aral Sea crisis may occur all over the world. However, a number of "socialistic" and "Soviet" factors further played a significant role for the Soviet authorities to endlessly postpone the implementation of effective measures. Nevertheless, Soviet scientists and party-state officials consistently convinced the omnipotent "power" and "ability" of human-beings and sciences as a transformer of nature, which was stemmed from the socialist ideology. The limitation of the "reflexive modernization" in the Soviet Union, accompanied by three misfits, transformed the Aral Sea crisis into the irreversible and unrecoverable disaster.

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