
An Example of Friendship and Cooperation Between France and Japan: Oyster Farming in Sanriku Area (Tohoku Region, Northern Japan) Before and After Tsunami – Restoration and Technical Adaptation of Culture Systems

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Abstract

In the 1960s, oyster culture in France was greatly perturbed by a mass mortality of cupped oyster caused by infection by the protozoan *Marteilia* sp. But oyster culture could be resumed by the timely help of export of spat from the port of Sanriku, northern Japan. After examination and identification of the pathogens, a large number of single-seed oysters were exported to France in the 1970s (Koganezawa 1984; Goto 2012).

On 11 March 2011, a huge tsunami surged against the coast of Sanriku and ravaged the fisheries and aquaculture installations included those for oyster culture.

After the disaster, with the solidarity to return assistance given in the past, the organizations of France decided to help reconstruct and reactivate the marine productivity in the coast of Sanriku. From several French cooperatives of oyster growers, equipment for oyster culture was sent to a Japanese cooperative, and from several research organizations, the contribution was sent to Japanese producers.

Independently to this contribution, in the framework of the long-term exchanges between the two “Sociétés franco-japonaises d’Océanographie” of France and of Japan, some scientific and technological equipments such as microscopes and plankton nets were donated to Japanese research centers and fishery cooperatives.

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Under the help of French colleagues, the oyster growers of Sanriku could restart the most important works, such as spat collection in the summer season, before the end of July to August in the same year as the disaster. In Miyagi Prefecture, about 75 % of oyster growers have restarted the oyster farming in the same region.

1 **A Short History of Cooperations Between the Two “Sociétés Franco-Japonaises D’Océanographie” of France and Japan**

Scientific and technological relationships in the field of marine sciences between France and Japan have been facilitated by dialogues and exchanges established between the Société franco-japonaise d’Océanographie of Japan (founded in 1960 and gathering around 250 members) and the Société franco-japonaise d’Océanographie of France (founded in 1984 and gathering around 70 persons as well as public and private organizations).

These two societies are mainly associations of researchers and other specialists in marine fields who have expressed their wish to promote efficient and pleasant relationships between Japanese and French individuals as well as organizations having similar fields of activities.

For several decades, the exchanges between the members of the two societies have been very fruitful and very friendly. The exchanges reached a maximum during common meetings (colloques, symposiums) alternatively organized in France and in Japan, approximately every 2 or 3 years. It is interesting to summarize them briefly.

Each of these symposia has been concretized by special official publications:

First edition in France at Montpellier in 1983 devoted to “Aquaculture.”

Second edition in Japan at Sendai in 1984 devoted to “Aquaculture” and a program of visit of fish and mollusk hatcheries.

Third edition in France at Marseille in 1985 with a special topic on “Coastal management and littoral planning,” organized with the support of numerous public and private organizations:

Physical oceanography and sediment dynamics, colored waters (red tides), teledetection, communications, microbiology of coastal waters, biological characteristics of coastal waters, artificial reefs, resources exploitation, and aquaculture.

Fourth edition in Japan at Shimizu in 1988 on the theme “General oceanography” presentation of communications, visits to aquaculture centers, centers of research, and universities.

Fifth edition in Japan at Hiroshima and Higashino in 1989, a series of six French-Japanese colloques, with a general topic: “Founding an algal park in Seto-nai-kai.”

Sixth edition in Japan at Tokyo in 1990 on “Coastline and conflicts,” held in the Maison franco-japonaise in Tokyo. Visits in Tokyo University of Marine Science and Technology (TUMSAT) and representatives of several hatcheries.

Seventh edition in Japan at Tokyo in 1990 on the “Determinism of Biological Recruitment at sea.” Visits of TUMSAT and several hatcheries.

Eighth edition in France at Ifremer Nantes in 1991.

Three French-Japanese symposiums were organized: “Determining factors of growth in aquaculture,” “Economy and management of fisheries,” and “Co-development of fisheries and recreational activities in coastal zones.”

Ninth edition in Japan at Tokyo in 1991 on “Oceanic fluxes.”

Tenth edition in Japan at Tokyo in 1992 with two symposiums: “Biotechnology and Environment” and “Determinism of Biological Recruitment at sea,” held in “Maison franco-japonaise de Tokyo” (Nichi-Futsu Kaikan).

Eleventh edition in France at Paris in 1997 with the special topic: “Coastal zone observation and forecast in the medium and long terms”; meetings held in “Institut océanographique de Paris.” Visit of the forum “SEAMER” at Paris and then a trip in Brittany to visit several hatcheries.

Twelfth edition in Japan at Tokyo in 2005 on the “Mutual new understanding for research in oceanography and fisheries, in France and in Japan.” Scientific meetings at Tokyo University of Marine Science and Technology (TUMSAT) and then visits to university laboratories, research vessels, official offices, and private firms in Onjuku, Abiko, and Shimizu.

Thirteenth edition in France at Marseille in 2008 on the “Global Change: interactions mankind/marine environments.” Scientific meetings held at the Faculty of Pharmacy of Marseille from the 8 to 10 September and then at the Paris Nihon Bunka Kaikan (Maison de la Culture du Japon à Paris) on 12 September with special *thema*: Oceanography, Microbiology, Bio-geo-chemistry, Coral reefs, Biodiversity, Management of littoral zones and artificial reefs, Aquaculture, and New techniques of observation in the marine environment.

Fourteenth edition in Japan at Kobe then at Tokyo in 2010 with the special topic “Toward sustainable use and management of the oceans.” Meetings held at Kobe in the international exhibition hall, in the framework of the forum “Techno-Ocean.” In

Tokyo, other meetings on education and on fish behavior, in TUMSAT (Kaiyodai) then a conference in “Maison Franco-Japonaise” (Nichi-Futsu Kaikan). Commemoration of the 50th anniversary of the “Société franco-japonaise d’Océanographie” of Japan.

2 Transportation of Seed Oysters from Japan to France in the 1960s

The mass production of oyster seeds (spat) in Japan started in the 1920s at Mangoku-Ura bay, Ishinomaki City, near Sendai. These seed oysters were transported to all regions around the Japanese coast, and in the 1940s, they were exported to the United States by ship.

For oyster culture, in European countries, France is the top producer and consumer, producing around 120,000 tons of the cupped oyster *Crassostrea gigas* annually and an additional 1,500 tons of the flat oyster *Ostrea edulis* (Buestel et al. 2009). The amount of production is about half of that of Japan (around 250,000 tons) (Fig. 1). There has been a close relationship in

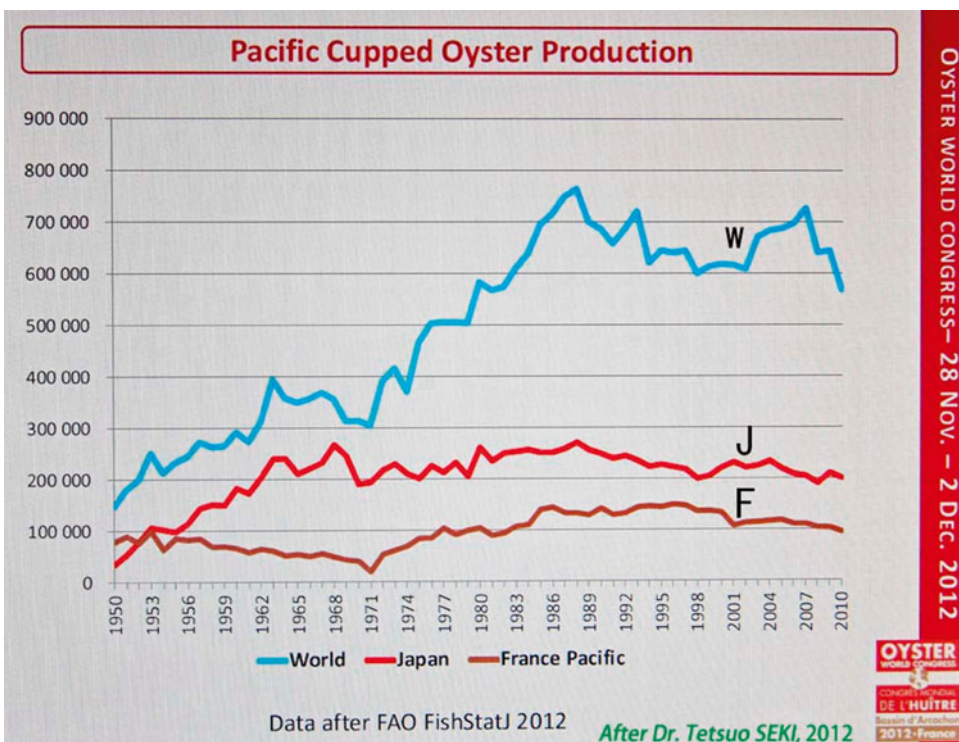


Fig. 1 Production of cupped oyster *Crassostrea gigas* in France and Japan (Adapted from Seki 2012)

the exchange of information and culture techniques between the two countries since about 40 years ago.

In the 1960s, the oyster farming in France was greatly affected by the mass mortality of *Crassostrea angulata* (called Portuguese oyster), caused by a viral disease and followed by infection from the protozoan *Marteilia* and the parasite *Bonamia*. To restore the culture industry after this problem, Dr. Trochan, the director of La Tremblade Institute (former Institut Scientifique et Technique des Pêches Maritimes), established contact with Professor Takeo Imai, of Tohoku University, asking about the possibility to export Japanese seed oysters to France.

After pathological and epizootic examinations and experiments of single oyster seeding, the project of exportation of oyster spat to France was put in place. These former examinations have been realized by the project group: Professor T. Imai (Tohoku University), Dr. Akimitsu Koganezawa (National Institute of Fisheries in Tohoku), Mr. Kunio Goto (Miyagi Prefectural Fisheries Experimental Station), and Dr. Marc Dupuis (Scientific Counselor of French Embassy in Japan).

The first trial of mass export by air took place successfully in 1969 under the authorization of both countries (Fig. 2a-k).

At that time, Professor François Doumenge from Montpellier University visited the Mayor of Ishinomaki City to find the best way to export seed oyster to France (Fig. 2l). This project was continued until 1979 (Goto 2012). Finally, in 1990, the oyster production in France was restored to about 140,000 tons (Fig. 3).

3 Aid from France After the Tsunami Disaster in the Sanriku Region

In Japan, on the 11 March 2011, a huge tsunami surged along the coast of Sanriku and heavily damaged the fishery facilities along the coast.

Just after the disaster, many contacts of encouragement from French members arrived proposing support for the fisheries along the

Sanriku coast. Especially, Profs. Hubert-Jean Ceccaldi (President of Société franco-japonaise d'Océanographie) and Catherine Mariojouis (President of Association pour le Développement de l'Aquaculture) proposed to collect contributions for the fisheries. To respond to their proposals, a special committee was formed between the French and Japanese members of "Société franco-japonaise d'Océanographie."

After discussing with researchers and members of fishery cooperatives of Sanriku, equipments for technical surveys that had been lost in the tsunami were requested. So the committee decided to support them with microscopes and plankton nets to examine the oyster larvae in the first spawning season after the tsunami.

The organizations that supported this collaboration are as follows:

- Association pour le Développement de l'Aquaculture (ADA)
- Société franco-japonaise d'Océanographie-France (SFJO-F)
- La Fondation d'Entreprise Air Liquide at Paris and Teisan in Japan
- Rotary Club Saint-Jean at Marseille
- Société franco-japonaise d'Océanographie-Japan
- (SFJO-J, ex-President: Shiro Imawaki, President: Teruhisa Komatsu and members)
- Gambalo Japan Project: Region of Bretagne
- Okaeshi Project: Marennes-Oléron area

These members started the donations from July 2011 and continued until October 2012. The members of the committee greatly appreciate Olympus Medical Science Co. Ltd. and Rigosha Co. Ltd. for the reduction of their price.

The amount of the contribution was 3,302,606 yen and the list of donations was as follows:

- 9 Microscopes, 5 plankton net for Miyagi Prefecture
- 8 Microscopes, 5 plankton net for Iwate Prefecture
- Life jackets for Taro Cooperative (Iwate Prefecture) by Gambalo Japan Project
- Buoys and ropes for Cooperatives of Miyagi Prefecture by Okaeshi Project

At the end of the year 2011, Prof. C. Mariojouis, the President of the Association of the

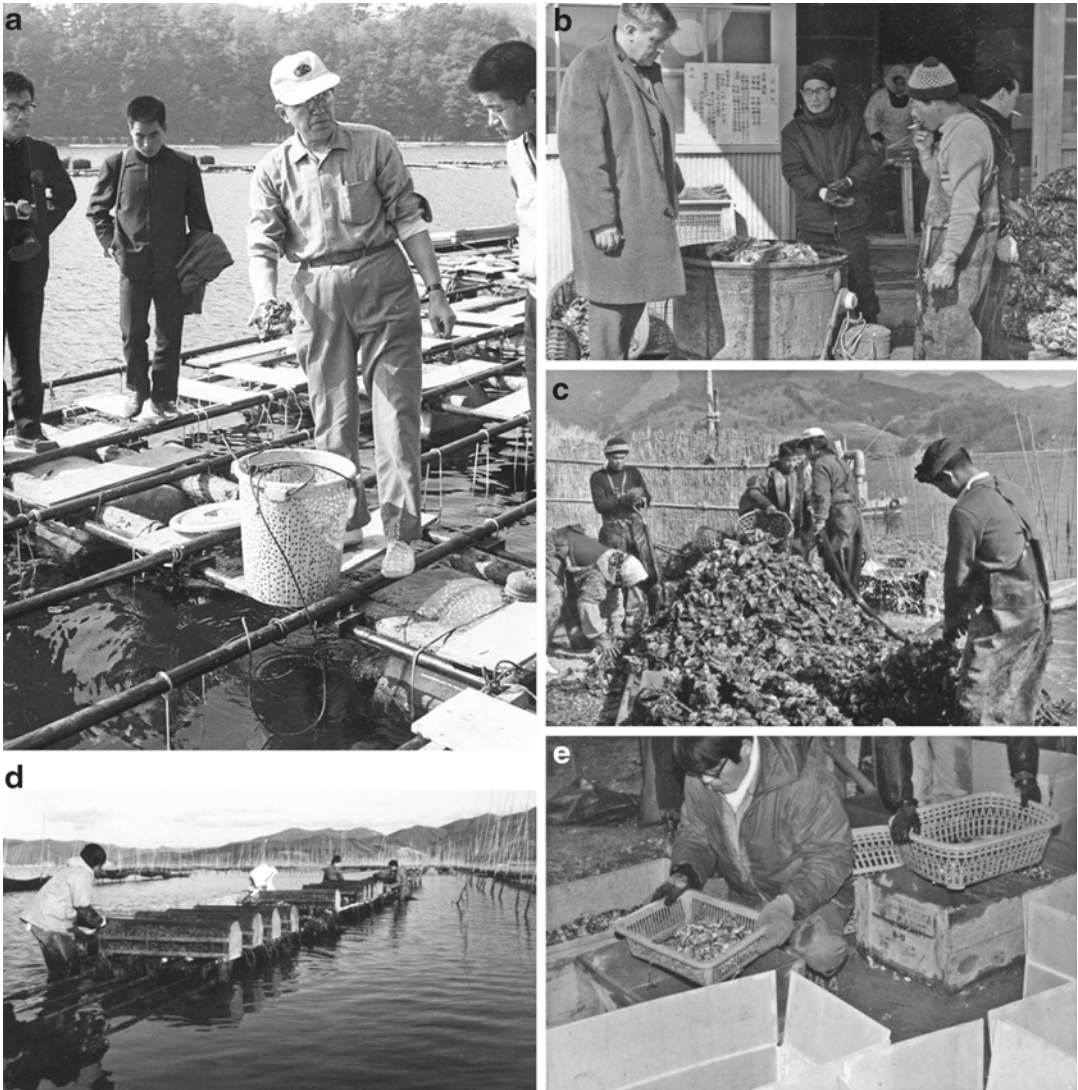


Fig. 2 (a–l) From the *top and left to right*: (a) Dr. Takeo Imai, Tohoku University; (b) the Scientific Councilor of French Embassy; (c) preparation for exportation; (d) experiment for single-seed oyster; (e) Mr. Kunio Goto, preparing single-seed oyster; (f) single-seed oysters;

(g) preparing single-seed oysters; (h) sorting and packing of seed oysters; (i) reportage by French TV crew; (j) sanitary and pathological check; (k) start to France by plane; and (l) Professor Doumenge with the Mayor of Ishinomaki City

Development of Aquaculture (ADA), visited the Sanriku region and related organizations and regional fishery cooperatives to encourage them. And on the beginning of February 2012, Dr. Hubert-Jean Ceccaldi, the president of SFJO of France, and Dr. Georges Stora of Centre d’Océanologie de Marseille, vice Secretary of SFJO of France, visited there also (Fig. 4a–e).

4 Exchange Information and French-Japanese Joint Seminar on Restoration of Oyster Culture in Sanriku

About one and a half years after the disaster, in September 2012, thanks to a donation of Maison Franco-Japonaise, a joint seminar was



左石津産の殻付き生牡蠣を輸入して
 るフランスの水産専門家が二十
 日、石巻市を訪れ、日本に空輸し
 ているシラスワナギの揚り便を使
 つて、日本産卵カキの輸入をや
 りたい」と語った。
 この人はモンペリエ大学で農業
 地理経済を研究するフランソワ・
 ドワーマンジュ教授。同教授は日
 本の養殖技術導入をはかるため十
 五日から三週間の予定で来日して
 いるもので、二十日午前、石巻市
 役所を訪れ、千葉市長から水産行
 政の事情を聞いたあと、奥水産林
 業部大阪支部長の案内で石巻魚
 市場、奥水産館を訪れ、養殖の
 千葉市長から市の水産行政
 を聞くドワーマンジュ教授（右
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Fig. 2 (continued)

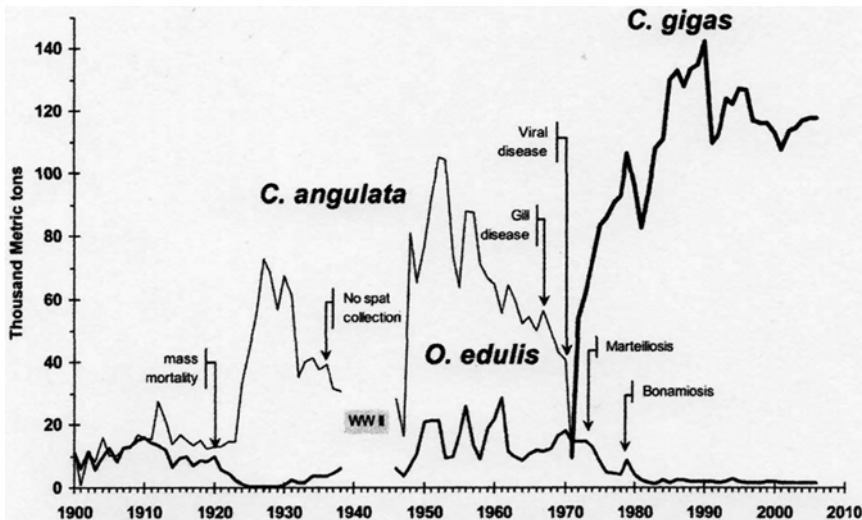


Fig. 3 Historical trend of French oyster production (Adapted from Buestel et al. 2009)

held in the Sanriku region with a French delegation. Members of the delegation were as follows;

Professor Denis Bailly (Professor of Université de Bretagne Occidentale), Prof. Catherine Mariojouis (Agro-Paris-Tech), Dr. Jean Prou (the Director of IFREMER laboratory in La Tremblade), and Mr. Olivier Laban (President of Aquitaine and Arcachon Regional Committee of Shellfish Culture). Two researchers of the Université de Bretagne Occidentale and eight oyster growers were funded by the French government.

The French delegation first visited Iwate and Miyagi Prefectures to observe the areas damaged by the tsunami, Taro and Osawa in Iwate and Shizugawa and Ishinomaki in Miyagi Prefecture. At the Iwate Fisheries Experimental Station, a ceremony of the last donation of microscopes was realized by Professor Catherine Mariojouis. Then at the Tohoku National Fisheries Research Institute at Shiogama, a joint seminar was held among the members of both the Japanese-French Oceanographic Societies and the Prefectural Fisheries Research Stations of Iwate and Miyagi and invited professors of universities and oyster growers of the regions.

After returning to Tokyo, another open seminar was carried out at the “Maison franco-japonaise” at the Ebisu quarter. The information exchanged at these seminars has been highly appreciated by both countries (Fig. 5a–e).

5 Participation to the Oyster World Congress at Arcachon and Technical Visit on Oyster Farms on the Atlantic Coast

After the joint seminar in Japan, Mr. Olivier Laban, the president of the First Oyster World Congress, proposed to the Japanese members to attend the world congress and present information on the cooperation for oyster culture between Japan and France. This congress was an epoch-marking event because the organizer was the group of oyster farmers associated with several research institutes. The date was from 28 November to 2 December 2012. About 250 participants from 27 countries attended. The members of the Japanese delegation were as follows: Dr. Tetsuo Seki (Program Officer of Agriculture, Forestry and Fisheries Technical Information Society), Mr. Kunio Goto (Adviser of the Fishery Cooperative of



Fig. 4 (a–e) From the top and left to right: (a) a part of the scientific equipment brought and given by the French delegation; (b) Prof. Mariojouis delivering the scientific equipment; (c) Dr. Mariojouis visiting Matsushima coop-

erative; (d) Dr. G. Stora, Prof. H.-J. Ceccaldi, and Prof. Y. Koike; and (e) news concerning the visit of Dr. Stora and Prof. Ceccaldi at Matsushima



Fig. 5 (a–e): (a) French delegation visiting the cooperative of Taro, Iwate Prefecture; (b) news for the visit of French delegation at Shizugawa cooperative; (c) visit at

Mangoku-Ura bay, Ishinomaki city; (d) joint seminar at Tohoku National Fisheries Research Institute; and (e) open seminar at Maison Franco-Japonaise, Tokyo

Shiogama City), Messrs. Yoshimasa Koizumi and Tamotsu Suzuki (members of the Fishery Cooperatives of Shiogama City), and Dr. Yasuyuki Koike (Member of Maritime and Fisheries Promotion Society in Tokyo University of Marine Sciences and Technology (TUMSAT), Counselor of SFJO of Japan).

The result was very efficient. Technical information from various countries was a good reference for Japanese oyster culture. Especially, recent pathological information was very important for the seed culture of each country.

After the congress, the Japanese delegation visited several oyster farms along the Atlantic coast, Arcachon-Aquitaine, Marennes, Bretagne Sud, and the stations of Institut français pour l'Exploitation de la Mer (Ifremer).

In Marennes, Mr. Goto who examined seed oysters before exporting in 1968 was guided to the seabed in Mouillelande where the first seed from Japan was released. And he could exchange information with the oyster grower who transported the first seed that arrived in Paris to Marennes. It was just a historical



Fig. 6 (a–d) From the top and left to right: (a) first World Oyster Congress at Arcachon, (b) news for Japanese delegation visiting oyster farm at Arcachon, (c) news for

Kunio Goto visiting the historical place where the first seed oysters from Japan were released, and (d) visit at Ifremer laboratory, La Tremblade

moment to recall the memories of 40 years ago (Fig. 6a–c).

After the site of culture, the delegation visited two stations of Ifremer, La Tremblade and La Trinité-sur-Mer, to exchange important pathological information about the disease and herpes of oysters with the specialists. Actually, in the last 5 years in France, there is the very important problem of disease in oysters again. The conclusion of the discussion was that seed oysters should not be exchanged from one region to another if there has been risk of pathogens being transferred. And the results of research and information about the disease must be open and readily disseminated to related countries (Fig. 6d).

6 The Restoration of Oyster Culture in Japan After the Tsunami Disaster

The time table of restoration project in 10 years by the government of Miyagi Prefecture is:

- First 3 years: The period of repair (2011–2013).
- Next 4 years: The period of regeneration (2014–2017)
- Another 3 years: The period of expansion (2018–2020)

Currently we are at the end of the first period of repair. By the statistics of the prefecture, the repair of oyster culture is going well. But we



Fig. 7 (a–f) From the top and left to right: (a) percentage of restarted oyster growers at Miyagi Prefecture in 2 years after the tsunami disaster, (b) reconstruction of Onagawa port, (c) young oyster grower returned back in family,

(d) horizontal growing technique of oysters in use in France (Arcachon), (e) vertical growing technique of oysters in use in Japan (Kesennuma), and (f) “Fine de Claire Verte,” the Marennes’ speciality

must think about the 30 % of oyster growers who have abandoned their activity (Fig. 7a).

Toward the restoration, what we must do now?

Most of all, it is necessary to repair the infrastructure as well as various other things. For example, in large areas of the seabed, there

are many macro debris that have not been surveyed.

Almost all fishing ports in the region were submerged by about 1 m under the level, and only 10 % of them were repaired (Fig. 7b). To repair the culture and processing facilities,

more materials and funds also are needed. But in the moment as it is not completely repaired, we can think about the density of culture facilities which was too much before the tsunami. Fortunately, there are at least several young oyster growers who have returned to work with their families, and they are very positive to adopt the new methods and aspects (Fig. 7c).

After these events, such as the joint seminar in Japan, the world oyster congress, and technical visit, researchers and oyster growers of Sanriku could have important information and new ideas on the differences of oyster culture style between France and Japan. The main differences of culture style in each country are as follows.

In France, where the tidal range is very large, they can use the huge intertidal zone horizontally for the culture site. In Japan, where the tidal range is not so large, they must use the coastal water vertically by hanging culture. So there are unchanged differences in the environment of both countries (Fig. 7d, e).

The oyster growers of Sanriku started the trials to adapt the new methods and ideas from France, for example, single oyster hanging method of Etang de Thau, culture at intertidal zone, and importing French materials such as Coupelles (seed collectors) with releasing machine of spat collection. These trials should increase the value of Japanese oysters for sale under the live condition with shells like the

French style. Normally, it is not so easy to change the traditional style of degustation, but after the disaster at a moment, it will be a good opportunity to change the custom (Fig. 7f).

7 Conclusion

There are numerous exchanges, some between scientists, some other ones between professionals of oyster culture, and some between the two “Sociétés Franco-Japonaises d’Océanographie.” But finally, there are good exchanges between the two countries, with mutual benefits and a large part of friendships.

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References

- Buestel D, Ropert M, Prou J, Goulietquer P (2009) History, status, and future of oyster culture in France. *J Shellfish Res* 28(4):813–820
- Goto K (2012) Historical memories of seed oyster transportation to France. Personal letter (in Japanese)
- Koganezawa A (1984) History of oyster culture in Matsushima. *News of Tohoku National Fisheries Research Institute* 26 (in Japanese)
- Seki T (2012) Oyster Industry threatening biotic causes in Japan. Oral presentation in the First Oyster World Congress in Arcachon