

フィリピンの河川産魚類相、特に通し回遊魚類相の解明～黒潮流域を中心とした周辺国への仔魚の供給源の解明に向けての予備調査

Freshwater and estuarine fish fauna of the Philippines: Toward elucidation of the larval dispersal mechanism of diadromous fish along the Kuroshio Current

11月21日から12月1日までフィリピンを訪問し、予備調査を行った。パラワン島とルソン島北部のカガヤン州およびイロコス・ノルテ州の大学や政府機関、自治体のオフィスなどを訪問し、プロジェクトの計画のための議論や必要な許可取得に関する情報収集を行った。季節的にどこのオフィスもクリスマスモードいっぱいであった。また、各地のフィールドの下見を行った。現地を視察し、研究者や学生と議論を行う中で、これまで想定していなかった数多くの興味深い研究トピックが見出され、非常に有意義な予備調査となった。

From November 21st to December 1st, we visited the Philippines and conducted a preliminary survey. We visited universities, government agencies, and local government offices in Palawan Island and the provinces of Cagayan and Ilocos Norte in the northern part of Luzon Island and discussed project planning and collected information on obtaining necessary permits. As it was the season, all the offices were filled with a Christmas atmosphere. We also visited some prospected study sites. During our field visits and discussions with researchers and students, we found many interesting research topics that we had not previously anticipated, making this a very meaningful preliminary survey.



Barangay Hall of Cabayugan, Puerto Princesa, Palawan

Members from Japan

Ken Maeda (Okinawa Institute of Science and Technology Graduate University) (hereafter: KM)

Midori Iida (Hokkaido University) (hereafter: MI)

Hirozumi Kobayashi (Natural History Museum and Institute, Chiba) (hereafter: HK)

Shotaro Hirase (The University of Tokyo) (participated in part online)

Collaborators in the Philippines

Herminie P. Palla (Western Philippines University Puerto Princesa Campus) (hereafter: HP)

Emma L. Ballad (Bureau of Fisheries and Aquatic Resources) (hereafter: EB)

Jemimah Ziegler (Bureau of Fisheries and Aquatic Resources) (hereafter: JZ)

Glycinea M. de Peralta (Cagayan State University Aparri Campus) (hereafter: GP)

Ernesto S. Del Rosario, Jr. (Mariano Marcos State University) (hereafter: ER)

パラワン島

Palawan

パラワン島では、ウェスタン・フィリピン大学プエルト・プリンセサ・キャンパス (WPU-PPC) を訪問し、HP 博士、Rodulf Anthony Balisco 博士、College of Fisheries and Aquatic Sciences の学部長である Jean Beth S. Jontila 博士らと情報交換、議論を行った。

In Palawan, we visited the Western Philippine University Puerto Princesa Campus (WPU-PPC) and discussed with HP and his colleagues, including Dr. Rodulf Anthony Balisco and Dr. Jean Beth S. Jontila (Dean of the College of Fisheries and Aquatic Sciences).

WPU-PPC のキャンパスにはマングローブ湿地 (元は試験用養魚池) があり、干潮時に予備調査を行った。多くの汽水性魚類が観察され、研究の計画を具体化することができた。

There is a mangrove swamp (unused fishpond) on the WPU-PPC campus, where we conducted a preliminary survey at low tide. Many estuarine fish species were observed, and useful information was obtained for planning the research.



Group photo of the team with the Dean of the College of Fisheries and Aquatic Sciences, WPU (from left: Dean Jontila, HK, MI, HP, KM, and Dr. Balisco)



Discussion with Prof Palla and Dr. Balisco at the specimen storage.



School of a dwarf goby, *Pandaka pygmaea*, observed at unused fishpond of WPU-PPC



Unused fishpond of WPU-PPC, which provide a good habitat for estuarine fish

パラワン島では、世界遺産の「プエルト・プリンセサ地下河川国立公園」が位置する Cabayugan 地区の下見も行った。保護地区であるため特別な許可を得て、洞窟に流入する Cabayugan 川の上流部を視察した。興味深い魚が複数観察され、研究の進展により重要な結果が得られることが予想された。

Balisco 博士が過去に洞窟内の調査を 2 回行っていることから、過去の調査についてレクチャーを受け、今後の調査計画を立てた。

We also visited Barangay Cabayugan, where the World Heritage Site "Puerto Princesa Subterranean River National Park" is located. With consent of the Protected Area Management Board (PAMB), we conducted our preliminary survey in the upper reaches of the Cabayugan River, which flows into the cave. Several interesting fish species were observed, and it is anticipated that important results will be obtained as research progresses in the future.

As Dr. Balisco has previously conducted surveys inside the cave twice, we received his lecture on past explorations and discussed with him planning future survey of the cave fish.



Lab work and discussion at WPU-PPC



Karst landscape of Cabayugan



Fishes observed in Cabayugan River



Water samples were taken at the point where the river flows into the cave for a preliminary environmental DNA study

カガヤン州

Province of Cagayan

カガヤン州はルソン島北東端に位置し、フィリピン本土の中で日本に最も近い。東海岸は黒潮源流域に面しているため、私たちの計画にとって重要な位置にある。ルソン島北部では、私たちの訪問前の1ヵ月間に6個の台風が立て続けに襲来したために大きな被害が出ており、各地で河川の氾濫の生々しい痕跡が見られた。幸い私たちの滞在中に台風は来なかったが、毎日大雨が降り、河川はどこも濁流で増水していた。調査時期の選定が非常に重要であることを再認識した。

Province of Cagayan is located in the northeastern part of Luzon, and is the closest area to Japan in the Philippines. Its east coast faces the source of the Kuroshio Current, making it an important location for our project. Six consecutive typhoons attacked Northern Luzon within a month prior to our visit, causing great damage, and vivid traces of river flooding could be seen in various places. Fortunately, no typhoons had come during our stay, but heavy rains fell every day, and rivers everywhere were swollen with turbid water. We were reminded once again that the selection of the survey period is important.

ツゲガラオ Tuguegarao

ルソン島北部の予備調査では、Department of Agriculture（フィリピン農業省）の Bureau of Fisheries and Aquatic Resources（水産資源局、以下BFAR）のEB博士およびJZ氏の協力を得た。カガヤン州の中心都市、ツゲガラオにあるBFAR Region II所長のAngel B. Encarnacion博士を訪問し、施設を見学した。

In the preliminary survey in northern Luzon, we received cooperation from Dr. EB and Ms. JZ of the Bureau of Fisheries and Aquatic Resources (BFAR) of the Department of Agriculture. We visited Dr. Angel B. Encarnacion, Director of BFAR Region II in Tuguegarao City, and toured the facility.



Cagayan River near Tuguegarao City. There were traces of flooding up to the high-water level



Group photo at the office of the Director of BFAR Region II (from left: HK, EB, HP, JZ, MI, KM, and Dr. Encarnacion, the Director)

ツゲガラオは、フィリピン最長の河川、カガヤン川の河口から約 100 km の位置にある。私たちは、ツゲガラオおよび近隣地域において、カガヤン川本流および支流を視察した。カガヤン川では現地で Ludong と呼ばれるカワボラが象徴的な淡水魚として知られるが、その回遊パターンや分布、生活史に関する知見は乏しい。BFAR 所長との面談においても、地元における強い関心がうかがえたことから、本プロジェクトにおける Ludong の研究の可能性を検討した。

Tuguegarao City is located about 100 km from the mouth of the Cagayan River, the longest river in the Philippines. We inspected the main course and tributaries of the Cagayan River in Tuguegarao and neighboring areas. The river mullet (*Cestraeus plicatilis*), locally called Ludong, is known as an iconic freshwater fish in the Cagayan River, but there is little knowledge about its migration pattern, distribution, and life history. In the interview with the Director of BFAR, we could see strong local interest, so we considered the possibility of conducting research on this fish in this project.

アパリ Aparri

アパリはカガヤン川の河口に位置する町である。ここでは、カガヤン大学アパリキャンパス (CSUA)、BFAR の Aparri Brackishwater Technology Outreach Station (ABTOS)、アパリ役場の農業委員長のオフィスを訪問した。

Aparri is a town located at the mouth of the Cagayan River. We visited Cagayan State University Aparri Campus (CSUA), BFAR's Aparri Brackishwater Technology Outreach Station (ABTOS), and the office of the Aparri Municipal Agriculturist (agriculture officer of the town).



A big lantern of Ludong (river mullet) hanging in front of the BFAR Region II office



Group photo at CSUA (from left: JZ, HK, KM, MI, GP, HP, and Dr. Audy R. Quebral, the Campus Executive Officer)



Group photo at Aparri Municipal Hall (from left: JZ, HP, Municipal Agriculturist, KM, MI, and HK)

ABTOS でのラボワークの際には、CSUA の学生約 20 名の見学を受け入れ、魚類の生態や研究計画について説明した。熱心な質疑も多く、共同研究の展開に期待を持つことができた。

About 20 students from CSUA observed our lab work at ABTOS, and we explained the ecology of fish and our research plan. There were many enthusiastic questions, and we have high hopes for the development of collaborative research.



KM gave a lecture to students from CSUA

MI explained about our otolith research to the BFAR staff, CSUA student, and collaborators



アパリの市場には多くの魚類が水揚げされており、中でも Ipon と呼ばれる両側回遊性ハゼ類の仔魚の山が目をつけた。

Many fish species were landed at the fish market in Aparri, and what caught our eye in particular were piles of larvae of amphidromous goby called ipon, an important resource with high demand.

← Goby fry (ipon) for sale at the Aparri market

カガヤン州北部沿岸地域 Northern coastal municipalities of Cagayan

カガヤン州北東部のサンタ・アナとゴンザーガでは役場を訪問し、町長や農業委員長との面談を行った。また、北部の海岸近くにあるブゲイとクラベリアにある BFAR の試験研究施設、Buguey Brackishwater Technology Outreach Station (BBTOS) と Claveria Brackishwater Technology Outreach Station (CBTOS) では、それぞれの施設周辺の汽水域にハゼ類が豊富に生息し、研究計画においてサンプリングの有力な候補地となることを確認した。

In Santa Ana and Gonzaga in the northeastern part of Cagayan Province, we visited town halls and met with the Mayor and Municipal Agriculturists. In Buguey and Claveria along the northern coast, we visited BFAR's research facilities, Buguey Brackishwater Technology Outreach Station (BBTOS) and Claveria Brackishwater Technology Outreach Station (CBTOS) and confirmed that the estuaries around their facilities are good habitats for gobies and are ideal candidates for sampling sites in the research plan.



Meeting to the Mayor of Santa Ana and Municipal Agriculturist



Group photo at Gonzaga Municipal Hall (from left: Municipal Agriculturist, KM, MI, HK, HP, municipal office staff, and JZ)



A mudskipper observed on the mudflat in front of BBTOS



We observed many wild fishes at fishponds of CBTOS



Damage from the typhoons left many areas around the rivers covered in mud, with downed trees and debris scattered around. Several areas were still flooded.



Together with CSUA student and staff, we tried collecting fish from small streams that had not been severely affected by flooding.

イロコス・ノルテ州

Province of Ilocos Norte

イロコス・ノルテ州はルソン島北西端に位置する。山を挟んで気候が異なるようで、連日雨が続いたカガヤン州とは打って変わって晴天であった。台風の影響のためか水は多かったものの、澄んだ水が流れる川も多く見られた。

Ilocos Norte is located at the northwestern tip of Luzon. It was sunny in contrast to Cagayan where it rained every day, as the two provinces are separated by mountains and have different climates. The water level was a little high probably due to the typhoons, but we could still see some clear streams.



Clear-water stream in Ilocos Norte

イロコス・ノルテでは、マリアーノ・マルコス大学 (MMSU) のメインキャンパスとクリマオキャンパスを訪問し、学長、教員および学生と面会した。またイロコス・ノルテ州の農業委員長と BFAR Region I Provincial Fishery Office の所長へも訪問、面会し、それぞれ、プロジェクトの概要を説明するとともに情報収集、意見交換を行った。また2日間、MMSU の ER 学部長、教員、学生と一緒にイロコス・ノルテ州内のフィールドの下見を行った。

In Ilocos Norte, we visited the Mariano Marcos State University (MMSU) Main Campus and Currimao Campus, where we met with the president, faculties, and students. We also visited the Provincial Agriculture office and BFAR Region I Ilocos Norte office. At every office visited, we explained the outline of the project and exchanged information and opinions. We also spent two days inspecting fields in Ilocos Norte with the Dean ER, faculties, and students from MMSU.



Discussion with the President of MMSU, Dr. Prima Fe R. Franco and the Dean ER



Group photo at the president office of MMSU



Interview with fishermen at a fishing ground of goby fry



A fyke net set at a river mouth to collect the recruiting larvae of the amphidromous goby (ipon)

ちょうど両側回遊性ハゼ類の仔魚 (Ipon) の漁期であり、河口周辺で定置網 (Fyke net) または引き網 (Seine net) により漁獲が行われていた (地域により漁法や規則が異なる)。網の準備をしていた漁師から聞き取りを行い、MMSU の ER 学部長および学生と一緒に共同研究を行う計画を立てた。

It was the season for goby fry (ipon) fishery. We observed the fishing ground at river mouths where fishermen use fyke nets and seine nets to collect larvae of amphidromous goby (methods and regulations vary depending on the municipality). After interviewing fishermen preparing their nets, we made plans to conduct collaborative research with the Dean ER and students from MMSU.



Interview with barangay people to find the habitat of the ricefish and halfbeak

カガヤン州とイロコス・ノルテ州ではフィールドの下見の際に多くの興味深い魚を見ることができ、今回面会した共同研究者らと本調査を行うことにより、多くの成果を挙げることができると予見できた。

During our preliminary field visits in the provinces of Cagayan and Ilocos Norte, we were able to see many interesting fish. We expect that the research project with the collaborators we met during this trip will be fruitful.



Rhinogobius larva found in a stream in Ilocos Norte