# 2016 全球石首魚平台國際研討會

# Global Sciaenidae Conservation Network International Conference

## 物種紅皮書大會，培訓及西太平洋石首魚紅皮書評估研討會

## *Species Red List Conference, Training Course and West Pacific Sciaenidae Red List Assessment Workshop*

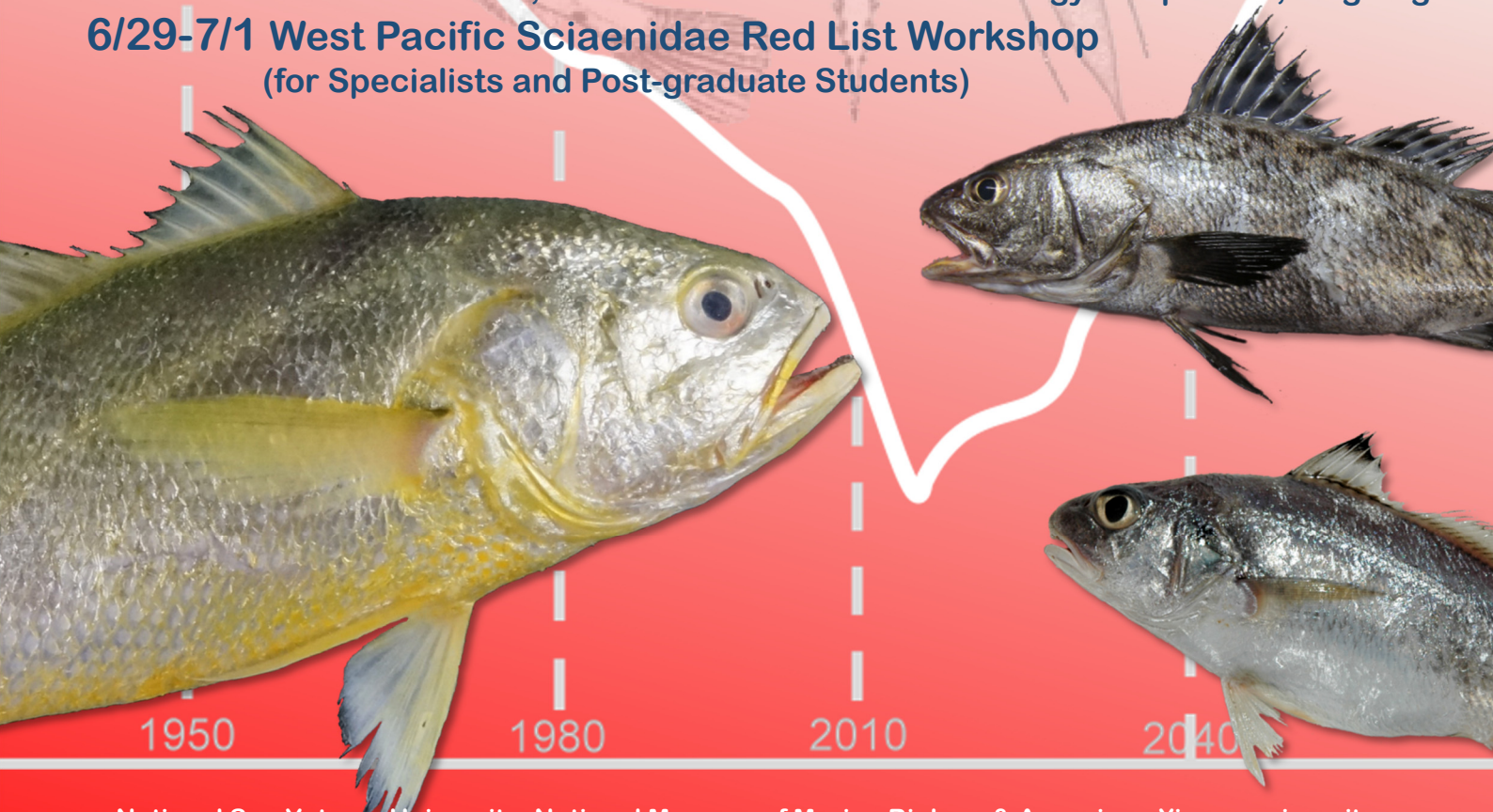
**國立中山大學 海洋科學院（高雄）**
**College of Marine Sciences, National Sun Yat-Sen University, Kaohsiung**

**6/26 General Conference** (for General Public)

**6/27-28 Red List Training Course/Workshop**
(for Researchers, Scholars and Students)

**國立海洋生物博物館 第二研究中心（屏東）**
**The Second Research Center, National Museum of Marine Biology & Aquarium, Pingtung**

**6/29-7/1 West Pacific Sciaenidae Red List Workshop**
(for Specialists and Post-graduate Students)




National Sun Yat-sen University, National Museum of Marine Biology & Aquarium, Xiamen niversity,
IUCN Sciaenidae Red List Authority, Bio-Amazonia Conservation International

SSC Species Survival Commission

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## GENERAL PROGRAM



## LECTURE ABSTRACT (by order of presentation / 依報告順序)

**[Part 1. June 26, 2016]**

**Theme 1: IUCN Red List of threatened Species & its Application (in Chinese)**



**Theme 2: Species Red Listing in Practice - presentations from participating regions and countries (in English)**

# Global Sciaenidae Conservation Network 2016 International Conference

**Conference title:**

**Species Red List Conference, Training and Western Pacific Sciaenidae Red List Assessment Workshops**
物種紅皮書大會，培訓及西太平洋石首魚紅皮書評估研討會

**Official Languages (大會語言):**
**English (primary) & Chinese (complementary) 英語為主，華語為輔。**

**Venue: College of Marine Sciences, National Sun Yat-Sen University, Kaohsiung 高雄 國立中山大學 海洋科學院**
地點 **The Second Research Center, National Museum of Marine Biology & Aquarium, Pingtung 屏東 國立海洋生物博物館 第二研究中心**

**Dates 日期: June 26 - July 1, 2016 月 26 日至 7 月 1 日**
**Website 網站: http://croakers.biodiv.tw/chi/2016GSCN_program.php**

**Sponsors 主辦單位**

- National Sun Yat-sen University (NSYSU). 國立中山大學
- National Museum of Marine Biology & Museum (NMMBA). 國立海洋生物博物館
- Xiamen University. 廈門大學
- IUCN Sciaenidae Red List Authority. 世界自然保護聯盟：石首魚專家組
- Bio-Amazonia Conservation International. 生物亞馬遜保育國際

**Endorsed by:**

- IUCN-GMSA - Global Marine Species Assessment Program, Old Dominion Univ. USA. 世界自然保護聯盟：全球海洋物種評估專項,美國
- IUCN –Species Survival Commission. 世界自然保護聯盟：物種生存委員會。

**Geographic areas 地理區域:** (FAO Fishing areas 61, 71 and 81)
West Pacific region 西太平洋: Japan, Korea, China, Taiwan, Philippines, Vietnam, Malaysia, Thailand, Indonesia, North & East Australia, New Guinea & Borneo

**Conference & workshop schedule and venues 大會，培訓，研討會時間地點**

**June 25 Participants arrive in Kaohsiung. 6 月 25 日國際專家抵達**

# Part 1. June 26, 2016

**Sunday for public participation, morning session in Chinese**
**6 月 26 日推廣性的公眾大會，上午華語演講，下午起英語演講**

This one-day session is aimed to public awareness and review of what has been done in the region, including a general introduction of IUCN Species Red Listing and similar practices in the region. Therefore, we have scheduled a morning session in Chinese and afternoon in English.
今日程序以向公眾推廣應用為主也由各國代表間接當地的紅皮書及類似的保育計畫。 上午以華語為主， 下午英語交流。

**Locality:** Auditorium, College of Marine Science, National Sun Yat-sen University, and Kaohsiung, Taiwan

**8:00-9:00** Registration 註冊，報到

**Morning session: (09:00 - 12:10, with a short intermission，** 09:50-10:00**)**

**9:00 Opening session (English & Chinese- 開幕華英雙語)**

**Welcome ceremony 開場白**
1. VIP addresses
2. Conference organizing committee (籌委會): Ning L Chao (趙寧), Meng-hsien Chen (陳孟仙), Chih-wei Chang (張至維) & Min Liu (劉敏)
3. Short videos （3-4 分鐘短片）

- What is IUCN? 什麼是 IUCN？
  <https://www.youtube.com/watch?v=0uf5e9vsXWo>
- What is IUCN Red List? 什麼是 IUCN 紅皮書？
  <https://www.youtube.com/watch?v=VukyqMajAOU>

**09:50-10:00 Announcement & Group Photo 通告與團體照**

**Theme 1： IUCN Red List of Threatened Species & its Application** IUCN 瀕危物種紅皮書及其應用？

**10:00-12:00** 華語報告 (Chinese reports, oriented to extension education & public awareness)

1. 趙寧 Ning L Chao: 什麼是 IUCN 瀕危物種紅皮書及它在物種保育中的角色。
   What is the IUCN Red List of Threatened species and its role in species conservation?
2. 何宣慶 Hsuan-ching Ho: 典藏標本與生物多樣性的保育。
   Museum collection and conservation of biodiversity.
3. 楊正雄 Cheng-hsiung Yang: 臺灣物種保育的概況。
   Biodiversity conservation policy & practice in Taiwan.

4. 武雲飛 Yun-fei Wu: 中國淡水魚類多樣性保護研究的回顧與建議。
   Conservation of Chinese Freshwater fish diversity: research, review and suggestions.

**Afternoon session 13:30-18:00**

**Theme 2: Species Red Listing in Practice -** presentations from participating regions and countries.

Speakers (20 min per speaker)

- Helen Larsen (Australia): The role of museum collection in Red List assessment.
- Gina Ralph (USA): Global marine species assessment program.
- Ying Giat Seah (Malaysia): Red List in Malaysia.
- HOSHINO Kouichi & SASAKI Kunio (Japan): An overview of Red Lists and red data books in Japan.
- Mudjekeewis Santos (Philippines): Red listing aquatic species in Philippines.

**15:30-16:00 Coffee Break**

- Sasanti Retno Suharti & Renny Kurnia Hadiat (Indonesia): Status of Family Sciaenidae in Indonesia.
- Cheng-hsiung Yang (Taiwan): Threatened biodiversity assessment and conservation practice in Taiwan.
- Min Liu & Yan Xie (China): Marine fish Red List and conservation in China.
- Quan Nguyen Van (Vietnam): Red List in Vietnam.
- Barry Russell (Australia): Red List in Australia.

**Additional presentations are scheduled on June 27 or 28.**

# Part 2. June 27 – 28, 2016

**GSCN 2016 Red List Training Course Syllabus (version June 16)**

Purpose: Aimed to provide professionals and graduate students a basic understanding of IUCN Red List goals, criteria and its role in local and global species conservation.

Locality: National Sun Yat-sen University, Kaohsiung, Taiwan.

Language: English

Lecturers are conducted by IUCN certified Red List Trainers, Dr. Heather Harwell and Dr. Gina Ralph, and additional invited speakers.

Principal Instructors:

Heather Harwell Christopher Newport University, USA
Gina Ralph, Old Dominion University, USA
Ning Labbish Chao, Taiwan/USA

**Locality: National Sun Yat-sen University, College of Marine Sciences**

**Day 1 (June 27, 8:30 - 17:30)**

**8:30 - 10:30**

**1. Welcome and Introduction to the training course & workshop**

- Workshop objectives. (Chao, Harwell, Ralph)
- Introducing Instructors and speakers.

**2. From Raw Data to Red List: Introduction to the IUCN Red List Assessment Process & Role of the Assessor (Heather Harwell)**

- An introduction to the IUCN Red List
- The Red List assessment process and role of the Red List assessor

**3. Data Collecting in Practice (Fisheries data for Red List assessment)**

- SAKAI Takeshi (酒井猛). Fisheries data collection in Japan.
- Hsin-Ming Yeh (葉信明). Applying fisheries data from southwestern Taiwan on Red List.

**10:30-11:00 Café Break**

**4. Key Terms & Concepts used in the Red List Criteria (Gina Ralph)**

- Definitions of terms used in the Red List criteria
- Exercise: Terms used in the criteria

**5. Regional red list and conservation in practice**

- Yvonnes Sadovy Marine fish Red list and conservation in Hong Kong

**Question & Discussion**

**Lunch 12:30-13:30**

**6. Red List Categories, Data Quality & Uncertainty (Heather Harwell)**
- The IUCN Red List Categories
- Data quality and uncertainty

**7. Introducing the Summary sheet (Gina Ralph)**
- Using summary sheet to give an overview of the Red List criteria.
- Give handout to participants, especially those can only participate one day.
- Q & A

**Café Break 15:30-16:00**

**8. Regional red list and conservation in practice. (30-40 min)**
- I-Shiung Chen (陳義雄), Chyng-Shyan Tzeng. (曾晴賢), Kwang-Tsao Shao (邵廣昭) Red List assessment of Freshwater fishes in Taiwan.

**Wrap-up, Discussion and Reflections on the first Day**

**Day 2 (June 28, 8:30-17:30)**

**9. Red List Criteria – criterion A (Gina Ralph)**
- Introduction to the criteria and the summary sheet
- Criterion A: theory and practice

**10. Red List Criteria – criterion B (Heather Harwell)**
- Criterion B: theory and practice

**10:00-10:30 Coffee Break**

**11. Red List Criteria – criteria C, D and E (Gina Ralph)**
- Criteria C, D and E: theory and practice

**12. Selecting the Final Red List Category (Heather Harwell)**
- How to select the final Category & Criteria

**Question & Discussion**

**Lunch 12:00-13:30**

**13. Using the Red List Criteria for regional Red Lists: How to Add the Regional Dimension. (Gina /Heather)**

- Why regional Red Lists are important
- Using the IUCN Red List Categories & Criteria for regional assessments

**14. Assessing species for regional Red Lists: (Chao)**

- Brazilian regional assessment as case study

**15:00-15:30 Cafe Break**

**16. Documentation Standards for Red List Assessments & Final Publication (Gina Ralph)**

- Importance of having full documentation for Red List assessments
- Submitting to IUCN.
- **This is our goal to complete WP Sciaenidae Red List Assessment**

**17. Special presentations**

- Sadovy Yvonne. Threats to croakers from the fish maw (swim bladder) trade.
- Kwang-Tsao Shao (邵廣昭), Hsin-Hua Lin (林欣樺), Hang Lee (李翰), Pai-Lei Lin (林沛立). Current status and perspective of digital archives of Taiwan fishes.

**Wrap-up, Discussion and Reflections on the course.**

## June 29. Travel & Relax:

Workshop participants will travel to National Museum of Marine Biology and Aquarium (NMMBA), located 80 Km from Kaohsiung, at Kenting National Park, Checheng, Pingtung. We will stop by scenic points and visit Aquarium before check into Hotel in Hengchun township.

# SUMMARY OF THE FIVE CRITERIA (A-E) USED TO EVALUATE IF A TAXON BELONGS IN AN IUCN RED LIST THREATENED CATEGORY (CRITICALLY ENDANGERED, ENDANGERED OR VULNERABLE).[1]

## A. Population size reduction. Population reduction (measured over the longer of 10 years or 3 generations) based on any of A1 to A4

| | Critically Endangered | Endangered | Vulnerable |
|---|---|---|---|
| **A1** | ≥ 90% | ≥ 70% | ≥ 50% |
| **A2, A3 & A4** | ≥ 80% | ≥ 50% | ≥ 30% |

**A1** Population reduction observed, estimated, inferred, or suspected in the past where the causes of the reduction are clearly reversible AND understood AND have ceased.

**A2** Population reduction observed, estimated, inferred, or suspected in the past where the causes of reduction may not have ceased OR may not be understood OR may not be reversible.

**A3** Population reduction projected, inferred or suspected to be met in the future (up to a maximum of 100 years) *[(a) cannot be used for A3]*.

**A4** An observed, estimated, inferred, projected or suspected population reduction where the time period must include both the past and the future (up to a max. of 100 years in future), and where the causes of reduction may not have ceased OR may not be understood OR may not be reversible.

*based on any of the following:*

- **(a)** direct observation *[except A3]*
- **(b)** an index of abundance appropriate to the taxon
- **(c)** a decline in area of occupancy (AOO), extent of occurrence (EOO) and/or habitat quality
- **(d)** actual or potential levels of exploitation
- **(e)** effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites.

## B. Geographic range in the form of either B1 (extent of occurrence) AND/OR B2 (area of occupancy)

| | Critically Endangered | Endangered | Vulnerable |
|---|---|---|---|
| **B1.** Extent of occurrence (EOO) | < 100 km² | < 5,000 km² | < 20,000 km² |
| **B2.** Area of occupancy (AOO) | < 10 km² | < 500 km² | < 2,000 km² |
| **AND at least 2 of the following 3 conditions:** | | | |
| **(a)** Severely fragmented **OR** Number of locations | = 1 | ≤ 5 | ≤ 10 |
| **(b)** Continuing decline observed, estimated, inferred or projected in any of: **(i)** extent of occurrence; **(ii)** area of occupancy; **(iii)** area, extent and/or quality of habitat; **(iv)** number of locations or subpopulations; **(v)** number of mature individuals | | | |
| **(c)** Extreme fluctuations in any of: **(i)** extent of occurrence; **(ii)** area of occupancy; **(iii)** number of locations or subpopulations; **(iv)** number of mature individuals | | | |

## C. Small population size and decline

| | Critically Endangered | Endangered | Vulnerable |
|---|---|---|---|
| **Number of mature individuals** | < 250 | < 2,500 | < 10,000 |
| **AND at least one of C1 or C2** | | | |
| **C1.** An observed, estimated or projected continuing decline of at least (up to a max. of 100 years in future): | 25% in 3 years or 1 generation (whichever is longer) | 20% in 5 years or 2 generations (whichever is longer) | 10% in 10 years or 3 generations (whichever is longer) |
| **C2.** An observed, estimated, projected or inferred continuing decline AND at least 1 of the following 3 conditions: | | | |
| **(a)** **(i)** Number of mature individuals in each subpopulation | ≤ 50 | ≤ 250 | ≤ 1,000 |
| **(a)** **(ii)** % of mature individuals in one subpopulation = | 90–100% | 95–100% | 100% |
| **(b)** Extreme fluctuations in the number of mature individuals | | | |

## D. Very small or restricted population

| | Critically Endangered | Endangered | Vulnerable |
|---|---|---|---|
| **D.** Number of mature individuals | < 50 | < 250 | **D1.** < 1,000 |
| **D2.** *Only applies to the VU category* Restricted area of occupancy or number of locations with a plausible future threat that could drive the taxon to CR or EX in a very short time. | - | - | **D2.** typically: AOO < 20 km² or number of locations ≤ 5 |

## E. Quantitative Analysis

| | Critically Endangered | Endangered | Vulnerable |
|---|---|---|---|
| **Indicating the probability of extinction in the wild to be:** | ≥ 50% in 10 years or 3 generations, whichever is longer (100 years max.) | ≥ 20% in 20 years or 5 generations, whichever is longer (100 years max.) | ≥ 10% in 100 years |



1 Use of this summary sheet requires full understanding of the *IUCN Red List Categories and Criteria* and *Guidelines for Using the IUCN Red List Categories and Criteria*. Please refer to both documents for explanations of terms and concepts used here.

# Part 3. June 30 – July 1, 2016

**Western Pacific Sciaenidae Red List workshop,**

Purpose: The goal of this Sciaenidae RLA regional workshop is to review and update 70 species of Sciaenidae species accessed in previous Red List Assessment Workshop, most were originally made in September 2009 in Manaus, Brazil.

**Locality:** National Museum of Marine Biology & Aquarium, Pingtung.

**Language:** English

**Participants:** Sciaenidae specialists and student interns & observers.

**3.1. Background:** Sciaenidae Red List Review Processes: (all drafts post on GSCN website,:
http://croakers.biodiv.tw/chi/2016GSCN_program.php

Assessments
Download password: 2016gscnassessment

About 70 species of Sciaenidae are included in this review processes. Two species have not been assessed previously, 67 species have already assessed before and the drafts are ready to be reviewed, including two Critically Endangered (CR), one Endangered (EN), one Vulnerable (VU), 36 Lest Concern (LC) and 26 Date Deficient (DD). We will review the threatened categories (CR, EN, VU) first, then split in two or more groups to review the assessments of 36 LC and 26 DD species. Finally two specie snot assessed can be added.

**3.2. Workshop set up.**

**June 30, 2016**

**8:00 BUS PICK UP FROM THE HOTEL KENTING**

**8:30 Opening session (Room 1)**

- Workshop objectives, schedule, methodology. (Chao, Heather/Gina)
- IUCN, SSC－Sciaenidae Red List Authority （NL Chao & M Liu）
- Participant introductions
- Divide in two groups based on FAO fishing area (61 & 71+ 81)

**9:00 - 10:00** Examples of Red List Assessments review Process (Gina/ Heather /Chao). We will pick two species to go through the review on Screen, questions and discussion.

**10:10 - 10:30 Coffee break**

10:30 - 12:00 WP Sciaenidae RLA review/ We will divide specialists in two groups:

Group 1. Facilitator Gina Ralph:  Specialists from Japan, China, Hong Kong, Vietnam, Taiwan & Philippines. (Room 1)

Group 2. Facilitator Heather Harwell: Specialists from Australia, Indonesia, Malaysia and Thailand. (Room 2)

**See attached Table 1 for Species assigned to each group.**

**12:00 -13:00 Lunch**

Continue WP Sciaenidae RLA review in two groups.

**15:00-15:30 Coffee break**

**15:30-17:30**
Continue WP Sciaenidae RLA review in two groups.

**17:30 -18:00** Wrap up Day 1 and Check progress and announcement (Room 1)

18:00 Bus Return to Hotel

Free Evening

**July 1, 2016**

**8:00 BUS PICK UP FROM THE HOTEL KENTING**

**8:30 -10:00 Opening session (Room 1)**

Continue WP Sciaenidae RLA review in two groups.

**10:10 - 10:30 Coffee break**

**10:30 - 12:00**

Continue WP Sciaenidae RLA review in two groups.

**12:00 -13:00 Lunch**

**13:00 -15:00**
Continue WP Sciaenidae RLA review in one or join two groups, depend on progress.

**15:00-15:30 Coffee break**

**15:30-17:30 (Room 1)**

**Join groups to wrap up the workshop.**

**18:00 Bus Return to Hotel**

**19:00 Going away banquet**

**July 2, 2016 Option tour**

**Group assignation of the West Pacific Sciaenidae Red List assessment.**

| | Species in the area | Workshop Groups 1 & 2* | Ranking | |
|---|---|---|---|---|
| 1 | ***Bahaba taipingensis*** | **G1** | **CR** | IUCN published |
| 2 | ***Johnius trewavasae*** | **G1** | **DD** | IUCN published |
| 3 | *Larimichthys crocea* | **G1** | **CR** | |
| 4 | *Johnius philippinus* | **G1** | DD | |
| 5 | *Larimichthys polyactis* | **G1** | DD | |
| 6 | *Nibea chui* | **G1** | DD | |
| 7 | *Argyrosomus amoyensis* | **G1** | LC | Synonym of *A. japonicus* |
| 8 | *Collichthys lucidus* | **G1** | LC | |
| 9 | *Collichthys niveatus* | **G1** | LC | |
| 10 | *Johnius distinctus* | **G1** | LC | |
| 11 | *Johnius grypotus* | **G1** | LC | |
| 12 | *Miichthys miiuy* | **G1** | LC | |
| 13 | *Nibea albiflora* | **G1** | LC | |
| 14 | *Nibea mitsukurii* | **G1** | LC | |
| 15 | *Pennahia argentata* | **G1** | LC | |
| 16 | *Pennahia macrocephalus* | **G1** | LC | |
| 17 | *Pennahia pawak* | **G1** | LC | |
| 18 | ***Argyrosomus japonicus*** | **G1 + G2** | **EN** | IUCN published |
| 19 | ***Atractoscion aequidens*** | **G1 + G2** | **VU** | IUCN published |
| 20 | *Nibea semifasciata* | **G1 + G2** | DD | |
| 21 | *Otolithoides biauritus* | **G1 + G2** | DD | |
| 22 | *Panna perarmatus* | **G1 + G2** | DD | |
| 23 | *Pterotolithus lateoides* | **G1 + G2** | DD | |
| 24 | *Atrobucca nibe* | **G1 + G2** | LC | |
| 25 | *Chrysochir aureus* | **G1 + G2** | LC | |
| 26 | *Dendrophysa russelii* | **G1 + G2** | LC | |
| 27 | *Johnius amblycephalus* | **G1 + G2** | LC | |
| 28 | *Johnius belangerii* | **G1 + G2** | LC | |
| 29 | *Johnius borneensis* | **G1 + G2** | LC | |
| 30 | *Johnius carouna* | **G1 + G2** | LC | |
| 31 | *Johnius plagiostoma* | **G1 + G2** | LC | Vietnam record? |
| 32 | *Megalonibea diacantha* | **G1 + G2** | LC | |
| 33 | *Otolithes ruber* | **G1 + G2** | LC | |
| | ***GROUP DIVISION*** | | | |
| 34 | *Panna microdon* | **G1 + G2** | LC | Vietnam record? |
| 35 | *Pennahia anea* | **G1 + G2** | LC | |
| 36 | ***Atrobucca kyushini*** | **G2** | **DD** | IUCN published |
| 37 | ***Boesemania microlepis*** | **G2** | **DD** | IUCN published |
| 38 | *Atrobucca adusta* | **G2** | DD | |
| 39 | *Bahaba polykladiskos* | **G2** | DD | |
| 40 | *Aspericorvina jubata* | **G2** | LC | |

| | | | | |
|---|---|---|---|---|
| 41 | *Atrobucca brevis* | **G2** | LC | |
| 42 | *Austronibea oedogenys* | **G2** | LC | |
| 43 | *Johnius australis* | **G2** | LC | |
| 44 | *Johnius cantori* | **G2** | DD | |
| 45 | *Johnius carutta* | **G2** | LC | |
| 46 | ***Johnius coitor*** | **G2** | **LC** | IUCN published |
| 47 | *Johnius heterolepis* | **G2** | DD | |
| 48 | *Johnius hypostoma* | **G2** | DD | |
| 49 | *Johnius laevis* | **G2** | DD | |
| 50 | *Johnius latifrons* | **G2** | DD | |
| 51 | *Johnius macropterus* | **G2** | LC | |
| 52 | *Johnius macrorhynus* | **G2** | LC | |
| 53 | ***Johnius novaeguineae*** | **G2** | **LC** | IUCN published |
| 54 | *Johnius novaehollandiae* | **G2** | DD | |
| 55 | *Johnius pacificus* | **G2** | DD | |
| 56 | *Johnius trachycephalus* | **G2** | DD | |
| 57 | *Johnius weberi* | **G2** | DD | |
| 58 | *Larimichthys pamoides* | **G2** | DD | |
| 59 | *Macrospinosa cuja* | **G2** | DD | |
| 60 | *Nibea leptolepis* | **G2** | LC | |
| 61 | *Nibea microgenys* | **G2** | LC | |
| 62 | *Nibea soldado* | **G2** | LC | |
| 63 | *Nibea squamosa* | **G2** | DD | |
| 64 | *Paranibea semiluctuosa* | **G2** | LC | Malaysia record? |
| 65 | ***Pterotolithus maculatus*** | **G2** | **LC** | IUCN published |
| 66 | *Pterotolithus lateoides* | **G2** | **DD** | |

**Not Evaluated Species**

| | | | |
|---|---|---|---|
| 67 | *Johnius vogleri* | | NE |
| 68 | *Larimichthys terenganui* | | NE |
| 69 | *Sonorolux fluminis* | | NE |

**Out of the region species**

| | | | | |
|---|---|---|---|---|
| | *Johnius mannarensis* | **?** | DD | Indian Ocean |
| | *Nibea coibor* | **?** | DD | Ganges river, India |
| | *Otolithoides pama* | **?** | DD | Northern Indian ocean |
| | *Daysciaena albida* | **?** | LC | Indian Ocean |

# 什麼是 IUCN 瀕危物種紅皮書及它在物種保育中的角色
# What is the IUCN Red List of threatened species and its role in species conservation?

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IUCN 受威脅物種紅色名錄，可以說是生命的氣壓計，預測物種存活的壓力，早做保育規劃，50 多年來，IUCN 紅色名錄是公認最完整的，由客觀的全球性視野來評估物種的保育狀況，以量化的標準把物種分類成九個位階，來反映物種的相對絕滅危機。位階中最糟的是「絕滅」，也就是種群量等於零了。目前已評估了七萬種動植物及真菌，目標是 16 萬。IUCN 紅色名錄位階是可以改變的，中國大貓熊 1996 年被列為瀕危物種，各種保育規劃落實了後，IUCN 專家們正在考慮，把貓熊在瀕危物種紅色名單中的等級「瀕危」降為「易危」。臺灣黑熊是亞洲黑熊的特有亞種，1989 年被臺灣的文化遺產和水土保持法列為瀕危物種，也是物種國際貿易公約 (CITES) 之受保護瀕危野生動植物種，禁止所有產品之國際任何貿易。然而，IUCN 全球評估並沒有將其列入受威脅物種。這並不是說臺灣黑熊的滅絕危機不重要，而是因為還沒有完成全球評估。地方紅色名錄」的目標是著重地區，所以無論國家或地方，各層次都同樣的重要，尤其地方才是保育政策規劃的推動者。若該物種是地區的特有種,如臺灣黑熊，地方的評估也就是全球性的評估。IUCN 物種紅色名錄有什麼用？ (1) 是生物多樣性位階的指標，用來通報國際保育政策及法規；(2) 指明有高度受脅物種地區，即「 生物多樣性關鍵區」，幫助工商業的規劃；(3) 指出那類行為及活動會促成物種絕滅，引導保育及法規的制定；(4) 找出知識的缺口，通告科學家會社；(5) 是一個溝通的工具，告訴媒體及 NGO 等，那些稀有物種會先失去？那裡？為什麼？人們又能夠做什麼？IUCN 物種紅色名錄不是決定保育的「優先」名單，有其他配套的社會、文化等情況；也不該把紅色名錄的結果直接連接到立法的程序。有的物種被排除在 IUCN 物種紅色名錄外，則是因為其為 經濟物種，或是具有文化的重要性。

附註：http://www.iucnredlist.org/about/overview

# 典藏標本與生物多樣性的保育
# Museum collection and conservation of biodiversity

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生物多樣性所代表的幾乎是我們生活的一切，每個人的生活與生物多樣性息息相關，而生物多樣性資訊最重要的來源就是生物典藏。生物典藏的樣本可以提供超乎我們想像的資訊。分類學家無時無刻從生物標本典藏中發現新種。不僅如此，透過生物標本我們可以研究已經滅絕的物種的一切，並且試著避免重蹈覆轍，我們可以了解生物在不同地理區、不同成長階段的變異。不僅如此，我們也可以深入了解生物的地理分布、生物的族群大小、生物的演化、生物的生態習性，以及更重要的，生物的自然史等等。臺灣的生物典藏制度的建立始於日據時代，但是歷經許多戰亂及改朝換代，始終無法有永續的生物典藏。未來該如何做，是值得我們思考的！

# 臺灣物種保育的概況
# Biodiversity conservation policy & practice in Taiwan

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臺灣的物種數目如果依據臺灣物種名錄 (Taibnet, http://taibnet.sinica.edu.tw) 的資料，至少已經登錄有 58,241 種 (2016.06.02 查詢)，其中大家比較熟悉的脊椎動物類群，也有 4,148 種之多。這其中哺乳類有 123 種，鳥類 717 種，爬蟲類 130 種，兩生類 47 種，魚類 (包含軟骨魚類) 則有 3,131 種。特有種類則有 9,187 種 (約佔全數近 16%)，若僅脊椎動物類群則亦有 288 種 (約佔全數 7%)。以臺灣島的面積來說，雖然比不上其他熱帶地區的生態熱點，但仍然十分多樣與豐富。但與世界上大多數的生態系一樣，臺灣的許多物種也遭受氣候變遷、人為污染以及捕抓等各項威脅，有些因此面臨族群數量劇降，分布面積縮減等狀況，甚至因此而瀕臨滅絕。為了以科學及系統性的方式，建立臺灣目前所有物種面臨威脅的狀況，進而提供未來進行各項生態保育措施的重要參考依據。特有生物保育中心、林務局與臺灣大學及中研院等單位，共同進行一項「脊椎動物紅皮書、保育行動計畫與受威脅物種監測」的整合性計畫，由脊椎動物類群著手，希望透過 4 年的時間，建立紅皮書系統與各類群的受脅狀況資料庫，並據以進行綱領層級的保育行動規劃及其合適的監測系統。紅皮書系統與資料庫的建立是整個計畫的核心項目，所謂紅皮書名錄 (Red List 或是 Red Dada Book) 因為自構想以來已經超過 50 年，期間多次演進，並且廣為各國利用作為各項保育工作的基礎資料，因此整個概念廣為人熟知。所謂紅皮書是指建立受威脅物種 (Threatened Taxa) 的等級評估資料。透過紅皮書名錄的建立，可以協助瞭解物種保育優先順序及保育經費預算分配，以及建立可監測的延續性基礎資料，並提供公眾快速瞭解及參與保育事務等多重功能。在臺灣以往已有植物 (4,174 種) 及脊椎動物中的淡水魚類 (52 種)

及鳥類 (89 種) 已經完成評估並且出版書籍或是報告書。只是當時的評估項目大多數是以專家意見進行，較少系統性的科學資料佐證。近年來，因為投入各項生態研究的人力與經費日多，不少物種都有較以往更為詳細的分類、分布等資料。因此是個合適開始以科學性方式建立紅皮書系統的時機點，本中心因此利用 IUCN (2001) 評估準則為基準，建立合適於本地的評估基準與系統，再依據中心內現有資料庫及各項研究整合，希望在兩年內可以完成所有脊椎動物的評估(哺乳類、兩棲類及爬蟲類) 與再評估 (鳥類)工作，建立紅皮書名錄及保育行動優先順序。

# 中國淡水魚類多樣性保護研究的回顧與建議
# Conservation of Chinese freshwater fish diversity: research, review and suggestions

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2004 年《中國紅色名錄》出版後，引起國家管理機構、科研單位、大專院校及生產部門的普遍重視，當即被公認是保護物種多樣性、厲行生物多樣性國際公約的重要依據和建立自然保護區，開展科學普及教育和培養專業人才的重要參考書。其原因主要是《紅色名錄》使人明確瞭解哪些是瀕危物種而必須加強保護。通過十多年的保護實踐已在瀕危動物保護區建設、禁漁宣傳、封湖護魚、增殖放流及表彰先進和漁政管理執法等各方面取得顯著成效。但是中國淡水魚類多樣性保護還存在不少問題，首先原先發佈的魚類紅色名錄（2004）中，新疆大頭魚和青海湖裸鯉被列在瀕危等級，而塔里木裂腹魚被列在極危等級顯然矛盾，分析認為當時新疆大頭魚應放在極危以上等級才算合理。第二認為《紅色名錄》的某些評估標準（C 和 D）略顯粗糙，應該充分考慮魚類水域分佈和繁殖習性的特點而制定更合適的評估標準。第三分類問題，特別是新種建立要嚴格把關、疑難種類應充分提供證據決定其存留。第四加強增殖放流的監管和評估體系的完善，不斷提高增值繁育和放流技術，避免人力物力和苗種的浪費。第五認真解決漁民思想問題，切實關心漁民的利益。

# The role of museum collections in the Red List assessment process

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Why are museum collections of importance? The rationale, use and relevance of collections is an essential part of scientific knowledge. Without knowing what names to use for species' populations, species cannot be managed, understood nor assessed for the IUCN's Red List. Discussion is provided on the need for collections, why correct names matter, the problems arising from incomplete or unreliable data, the use and misuse of databases (museum, online, global) and the need for verification of names as well as data. The value of networks, both international and social, formal and informal, and sharing of information, must be recognized.

# The Global Marine Species Assessment: 2005-2016

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The International Union for the Conservation of Nature (IUCN) “Red List of Threatened Species” is the global standard for evaluating conservation status, relying on extinction risk theory to categorize species according to symptoms of high extinction risk. Prior to 2005, the representation of marine species on the IUCN Red List was very limited, consisting primarily of charismatic megafauna and a few commercially important fishes. To fill this substantial gap, the Global Marine Species Assessment was formed with the goal of completing 20,000 marine species assessments and contributing substantially to global, regional and local marine conservation capabilities. Now, 10 years later, over 13,000 species have been assessed at 61 workshops involving 520 experts from 311 institutions in 53 countries. Of the approximately 11,600 extant marine species for which sufficient data are available, 12% are threatened; however, the uncertainty surrounding the status of the 2,500 species for which data are insufficient results in a range of 9.5-32%. Unlike terrestrial or freshwater species, exploitation is the most pervasive threat to marine species, though habitat specialists and those with restricted ranges are also frequently at higher risk of extinction. In addition to publishing the pending 2,000 species and assessing the remaining 6,000 required to meet our 20,000 species goal, we are increasingly interested in sub-global scale projects, where higher resolution data, including those on distribution and population trends, can be utilized.

# Red List Status in Malaysia

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According to “National Policy on Biological Diversity 2016 – 2025”, there are an approximately 15,000 vascular plant species, 307 mammal species, 785 bird species, 242 amphibian species, 567 reptile species, 47 marine mammal species, as well as 1,951 freshwater and marine fish species present in Malaysia. Our nation is one of the 17 mega diverse countries, with large number of endemic species such as 70% of palm species are found only in Malaysia. Our land is a home to a vast variety of floral and faunal communities that supply us with food, water and numerous economic benefits. The significant human population growth and transformation process of Malaysia into a high-income nation by 2020 has placed a lot of pressures on its biodiversity, drastically driving many species to various levels of threat to the extent of extinction such as the Malayan tiger. As a result, iconic species like Sumatran rhinoceros and leatherback turtle have undergone local extinction. However, determination of the exact threats on the biodiversity has proven difficult due to the existence of various factors including climate

change, habitat fragmentation, invasive alien species, over-exploitation and pollution. Although various steps have been taken to protect the biodiversity, the loss of biodiversity in Malaysia is substantially increasing. The downfall for the biodiversity wealth may be triggered by low management capacities and fund available from the governance, as well as low conservation awareness among the citizens. Thus, the government need to recognize these challenges and provides clear framework and actions to conserve our biodiversity while utilizing it in perpetual basis. Currently, Malaysia is actively involved in biodiversity-related multilateral conventions and agreements such as the Convention on Biological Diversity. Numerous obligations have been made to enable the government policy and management to be performed effectively for biodiversity conservation. The evaluation of red list in Malaysia primarily followed the IUCN suggestion. To date, only marine fishes are yet to be assessed or listed under red list status in the Malaysia context.

# An overview of Red Lists and Red Data Books in Japan

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In Japan, Red Lists (RLs) and Red Data Books (RDBs) have been published by Ministry of the Environment (MOE), Fisheries Agency, local governments, and other organizations. RDBs of MOE (latest version published in 2014-2015) cover 10 major taxa (mammals, birds, reptiles, amphibians, brackish & freshwater fishes, etc.). For example, RDB of brackish & freshwater fishes (MOE, 2014) contains 167 species, including re-discovered “kuni-masu” (*Oncorhynchus kawamurae*) and Japanese eel (*Anguilla japonica*). RLs of marine organisms (including fishes, molluscus, crustaceans, etc.) are currently prepared by MOE, but the species under stock management measures by the international frameworks or by Fisheries Agency are precluded. Fisheries Agency published RDB in 1998, covering marine and freshwater fishes, mammals, molluscus, crustaceans, etc. Regarding local governments, all of 47 prefectures and some of major cities have published their own RLs and/or RDBs, focusing on local populations. In addition, some of academic meetings and NGOs have also published RDBs (e.g., The Mammal Society of Japan, 1997).

# Red Listing Aquatic Species in the Philippines

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The Philippines possess one of the largest fisheries and is home to the highest number of marine species per square area in the world, gaining the distinction of being the center of marine biodiversity. Unfortunately, it is also considered as one of the hotspots in terms of marine conservation due to numerous threats to its biodiversity. Here we present the status of Red Listing of aquatic species in the Philippines under the IUCN as well as the various frameworks and activities related to this. Two (2) laws, Republic Acts 9174 (Wildlife Resources and Protection Act) and 8550 (The Philippine Fisheries Coded of 1998) as amended by 10654 (An Act to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing) provides the legal framework for adopting IUCN guidelines and providing the mandate to do the management and conservation of aquatic species in the country. Under these laws, the Philippine Aquatic Red List Committee has been created. Thus far, two major Red List status reports for aquatic species have been published; Red List Status of Marine Mammals in the Philippines (Alava et al., 2012) and the Red List Status of Marine Endemic Teleosts (Bony Fishes) of the Philippines (Alava et al., 2009). Other activities related to IUCN Red List include activities under the CITES implementation, publication of the National Plan of Action for (NPOA) Sharks, attendance to meetings and trainings, production of Information and Education Campaign (IEC) materials etc. Finally, we present the National Stock Assessment Program (NSAP), a catch and effort data collection and monitoring by species being implemented by BFAR-NFRDI in more than 700 fish landing centers all over the country since 1997. We show here how this Program is an important platform for species specific assessments in the Philippines and provide here some examples.

# Status of Family Sciaenidae in Indonesia

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Indonesia is an archipelagic country, the number of islands around 13.466 islands, the land area ± 1.922.570 $km^2$ & marine area ± 3.257.483 $km^2$ (BIG 2016). The fish diversity in Indonesian waters consist of ± 4682 species, 1213 freshwater fish species and 3632 marine fish species (Fishbase 2016). Family Scianidae consisted of 65 genera with 283 species (Fish Base, 2016). In total 131 records, (Eschmeyer, ..) stated only 67 as valid genera, the other 64 genera are synonyms or uncertain status. The information about Sciaenidae in Indonesian are mostly based on the old specimens. There are 28 records of Sciaenidae collected in Indonesian waters (Eschmeyer, ….), but only 14 species consider as valid species. Almost all of those 14 valid species (*Aspericoryina jubata, Bahaba polykladiskos, Boesemania microlepis, Johnius amblycephalus, J. borneensis, J. goldmanni, J. heterolepis, J. hypostoma, J. macropterus, J. Plagiostoma, J. trachycephalus, Panna microdon, Pterololithus lateoides*) described by Bleeker (year 1849-1873), only one species described by Cuvier in 1830 i.e *Pterotolithus maculatus*. Kottelat (2013) added another valid species, i.e *Johnius weberi*, which was described by Hardenberg in year 1936. Three species described based on the specimens from other countries, but Indonesian water are in the distribution area of *Pennahia anea, Dendrophysa russelii* and *Nibea squamosal.* Eight species of Scianidae were described from Indonesian waters, but those became synonym of the other species, while another three species the status still uncertain.

# Threatened biodiversity assessment and conservation practice in Taiwan

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IUCN (The International Union for Conservation of Nature) had developed Red-list categories and criteria system for threaten species conservation over 50 years, and the Red-list indicator are being used to by many countries that parties to the Convention on Biological Diversity (CBD) to report on and measure progress toward the Aichi Biodiversity Targets, in particular, Target 12: By 2020 the extinction of known threatened species has been prevented and their conservation status, particular of those most in decline, has been improved and sustained. In order to setup basic threaten information of species in Taiwan, TESRI and Forestry Bureau developed a new project to access or re-assess vertebrate wildlife taxon around Taiwan, including mammals, birds, amphibians, reptiles and fish, base on the process of IUCN Red List Categories and Criteria. The purpose are to identify the list and status of threatened species in Taiwan, and set up the knowledge database of Red-list (Threatened species), and then develop the overall conservation programme of action strategic to each group. Finally, the project will focus on the priority groups and taxons to develop each strategic planning project and proper monitoring system to access the result of conservation action. The first year achievements of this project including: 1. Built a complete datasheet included criteria that IUCN adopted. In addition to review existed materials, we have calculated the EOO (extent of occurrence) and AOO (area of occupy) for

every taxa with distribution data by using our internal TBN database and related research result. 2. Complete the red list assessment database-format table and procedure, and build half of a predetermined taxa list of taxa assessment procedures. 3. Pretest the priority assessment system of 52 threatened freshwater fish according the cause of threat, measurement of conservation and feasibility of monitoring system and propose the conservation action programme. 4. Developed Standard operation procedure (S.O.P.) of monitoring system in some species. We also setup auto assessment system in cooperation with the Academia Sinica staff, then we can pre-assess our data table and review more quickly by expert. We will finished the assessment procedure and publish the Redlist book in 2017.

# Marine fish Red List and conservation in China

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China initiated the red listing project in 2000, following the 2001 IUCN Red List Categories and Criteria (Version 3.1). In the 3 volumes of China Species Red List edited by Sung Wang and Yan Xie and published in 2009, approximately 10,200 species in both animal and plant kingdoms occurring in China (including Taiwan, Hong Kong and Macau) were assessed. In China Species Red List Volume II: Vertebrates Part I (2009), a total of 734 fish species from 467 genera, 184 families, 42 orders and 4 classes were assessed; 539 were marine and 195 were freshwater. Professors Han-lin Wu and Yun-fei Wu were the only two assessors for marine and freshwater species, respectively, together with about 10 reviewers. Besides following the IUCN categories, China added another two, i.e. Regionally Extinct (RE) (species extinct in China but still occurs in other regions) and Not Applicable (NA) (species occur in their distribution edge, together with data deficient). In the Classes Myxini and Cyclosotmata, all the 11 species assessed were in EN (7) and VU (4). In the Class Chondrichthyes, 117 species were assessed and 111 species (94.87%) were listed in EN (71) and VU (40). In the Class Osteichthyes, 604 species were assessed, including EX (6), EW (4), threatened species 524 (86.47%), NT (2), LC (50) and DD (20). In the threatened category, 20 species were in CR, 208 species in EN and 296 species in VU. In the Family Sciaenidae, 30 species were assessed and 20 (66.67%) were listed in EN (6) and VU (14). Most severe threats to fishes in China included habitat degradation and loss, over-exploration, accidental mortality and intrinsic factors, and there were very few conservation actions

available. The few existing conservation actions included research actions, species-based actions and policy-based actions.

# Conservation status of Australian fishes

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Australia has a total of about 4,460 fish species (4,260 described, 200 undescribed), made up of around 260 freshwater and 4,200 marine and estuarine species. The conservation status of Australian fishes is subject to the Australian Government's *Environment Protection and Biodiversity Conservation Act (EPBC Act 1999)* and to various State and Territory Environmental or Wildlife protection legislation. At the national level, threatened fauna and flora may be listed under Section 178 of the *EPBC Act* in any one of the following six categories: Extinct (E), Extinct in the wild (EW), Critically endangered (CE), Endangered (EN), Vulnerable (VU), and Conservation dependent (CD). These categories only approximately align with International Union for Conservation of Nature (IUCN) categories and criteria for assessing a species for inclusion on the IUCN Red List. Only 56 species of fishes are listed under the Australian EPBC Act: 1 species as EW: 8 as CE; 16 as EN; 24 as VU; and 7 as CD. A further 58 species are variously listed under different State and Territory legislation. In addition, some species of fishes also are 'Protected' under State and Territory Fisheries legislation. Of the total 112 Australian fish species listed as threatened, most (79%) are freshwater; the remaining species (21%) are marine or estuarine. Australia's freshwater fishes are under greatest threat, with about 34% of freshwater species listed as threatened. The conservation status of marine and estuarine fishes has received much less attention in Australia, with listed species representing <1% of the total fauna. There is little consistency between Australia's National, State and Territory legislation for listing threatened species, and there is a critical need to harmonise the *EPBC Act* and various State and Territory legislation to conform to the same common categories and criteria, and to more closely align with IUCN Red List framework.

# Perspectives of Red List in Vietnam

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The Vietnam red data book (VRDB) contains a list of animals and plants were ranked as the rare/endangered species, ongoing to decline of individual accounts or under to be extinction. It assists to contribute crucial science based for the government to issue the decree and direction/guidelines in relation with management, protection and proposition of the emerging solutions to conserve and sustainable development of the wild life flora and fauna in Vietnam. The Vietnam Academy of Science and Technology (VAST) played as the facilitator to carry out the assessment processes of prospective species to involve in the Red List of the VRDB. All the criteria and categories used in the assessment were strictly followed the protocol guided by the IUCN. Through time, the red list of rare/endangered species have been issued in 4 version of the VRDB (1992, 1994, 2004, 2007).

The latest version of VRDB in 2007consists of 882 species: 418 spec. of animals and 464 spec. of plants living in terrestrial, freshwater, brackish and marine waters environment. For the marine fishes, 53 species were recorded in the VRDB and the major categories ranked at EN, CR and VU. In the vision of the intensive fishing practices and abnormal climate changes, a number of species can keep rising if the national strategic plan on protection of biodiversity will not be able to effectively put on action. However, challenges occurring with assessment of Red List are critical problems, include lack of the experienced taxonomy experts, data mining limitation, and funding support is very limited. These can be solved by diversification of the international collaboration activities in the network through staff exchanging, taking part in the current funded project, organizing the technical training skills for young scientists. Thus, it aims to establish of the marine bioinformatics database on the economic, endangered species living in the coastal areas of Vietnam.

# Fisheries data collection in Japan

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Fisheries data of 8 common Sciaenidae species in Japan (#1 *Argyrosomus japonicus*, #2 *Atrobucca nibe*, #11 *Miichthys miiuy*, #13 *Nibea mitsukurii*, #15 *Pennahia argentata*, #8 *Larimichthys crocea*, #9 *Larimichthys polyactis*, #12 *Nibea albiflora*) were collected for the Red List assessment. Formerly, Sciaenidae species had been caught by Japanese large trawl fisheries in quantities at the East China Sea. The peak of fish catch of *Argyrosomus japonicus* and *Atrobucca nibe* were 143 tons in 1954 and 5,249 tons in 1959, respectively. These species are not caught by Japanese fisheries in the East China Sea in recent years; in contrast at a country coastal region around Miyazaki, Oita and Ehime prefecture, the resources of these species are used sustainably. Though amount of *Larimichthys polyactis*, *Larimichthys crocea* and *Nibea albiflora* had been caught in the Yellow Sea and Northern East China Sea until the 1980s, they were not caught any more with a decline of Japanese fishing vessels and reduction of fish grounds. In the East China Sea, catch of *Pennahia argentata* peaked at about 24,000 tons in 1978, starting to decrease after that, dropped to 15 tons in 1998. *Nibea mitsukurii* distribute mainly in eastern Japan is not often used because of low value; there are not noticeable change in stock. *Miichthys miiuy* catch by Japanese trawlers in the East China Sea disappeared once in 2006; however several tons of catch are recorded in recent years.

# Applying fisheries data from southwestern Taiwan on Red List

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The reported productions of marine capture fisheries by top five fishing gears are seine, trawl, longline, gillnet, and set net in Taiwanese EEZ. Trawl (mainly bottom trawl) contributed the second largest production about 31.9 thousand metric tons or about 18.9 percent of total production, which is about 169.3 thousand tons.

Trawling remains an advantage method of survey research due to non-selective and the resultant capture of a huge diversity of non-target species. The dominance of small-scale fisheries, with most operations lasting from a day to a few days, and the tropical characteristics of the ecosystem, with individual species having a relatively small stock size compared to those in temperate waters differentiates the marine capture fisheries in Taiwan from larger-scale temperate fisheries. In general, single hauls with 50 species or more are quite frequent.

Taiwan Fisheries Research Institute developed a Vessel Monitoring System to monitor the location and movement of commercial fishing vessels. VMS resolves the problem of unknown fishing positions which are a major useful information to the fishery scientist studying the distribution and migration of commercial fish. Vessels position, gonadal development of fishes, logbook of fishing vessels, and length-frequency of fishes are integrated and analyzed by Geographical Information System. The possibility of applying fisheries data from southwestern Taiwan on red list is proposed.

# Red listing in Hong Kong - challenges and progress

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The first application of regional IUCN criteria and categories to a subset of Hong Kong marine fishes was done in 2014-5 as part of the government's work and Biodiversity Strategic Action Plan under the CBD. The initial aim was to test whether the IUCN criteria could be applied to the local Hong Kong context and 27 fish were trialled with several found to be threatened. While the BSAP is still under consultation, it is clear that the red listing process was relevant to Hong Kong and also that attention to a number of species is clearly needed. The way ahead to protecting these species in Hong Kong is not yet clear given that there is not yet any legislation for threatened marine fishes or invertebrates, despite protection for some species in mainland China. There is also a need to harmonize the approach for conservation of marine species between Hong Kong and the mainland.

# Red List assessment of freshwater fishes in Taiwan

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“Red Data Book of Freshwater Fishes in Taiwan” has been published in 2012. However, the overall evaluation progress of all recent revised checklist of inland-water/freshwater fishes established by the Taiwan Ichthyological Society since early 2008 under the support of Forestry Bureau, COA, Executive Yuan. Five main criteria for list evaluation organized by the society including: (1) distribution range; (2) status of dominance; (3) trend of wild population; (4) Ranking of endemicity; and (5) current threat. Among them, three fish species are critically endangered; three fish species are endangered; and 15 species are vulnerable. In addition, the book also documented other 31 fish species are near threatened. The fish book has become the important conservation guideline of freshwater fishes in Taiwanese waters since then.

The further conservation action and impact for the governmental conservation support of freshwater fish red list establishment would be presented and discussed herein including the inland water fish population restoration in rescue/reproduction system of NTOU. One successful

conservation action case for the endangered cyprinid, *Metzia mesembrinum* has been restored and created for the new recruitment of fish population in NTOU although it has been extinct in Taiwan island since 1920.

# Threats to croakers from the fish maw (swim bladder) trade

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The use of and trade in fish, particularly croakers, is extensive, valuable and little understood with several species already threatened by the trade and several others potentially so. An update of the global situation will be presented along with data gaps and information needs. As one example, molecular work is often needed to confirm which species provide the dried swim bladders found on sale in Hong Kong, but global sequence databases do not yet have a full complement of croaker samples. Experts in this taxon could significantly contribute through their work towards improving the scope and quality of this database while further work to understand the trade, and identify opportunities for sustainable sourcing, can be explored.

# Current status and perspective of digital archives of Taiwan fishes

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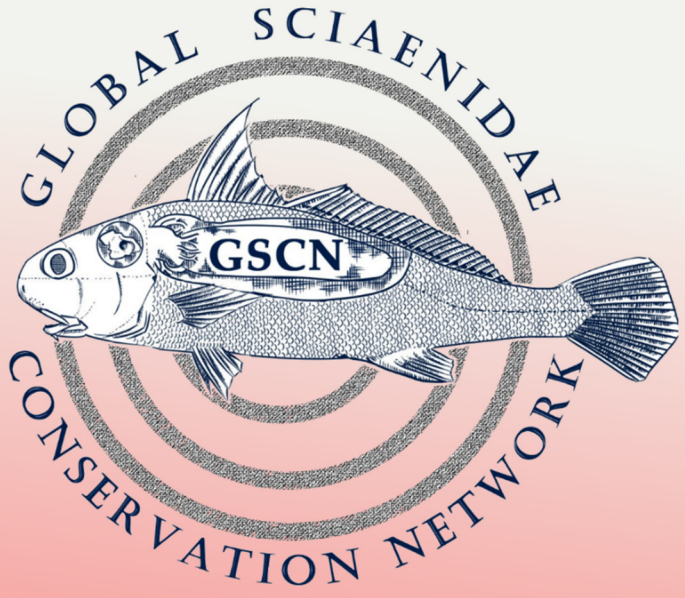
*The Fish Database of Taiwan* (fishdb.sinica.edu.tw) was established in the early 1990s and has collected and integrated information such as classification, distribution, specimens, and references on 298 families and 3,195 fishes of Taiwan. The contents include species descriptions (2,811 species), specimens (49,101 lots) images (3,863 ecological photos and 992 videos), skeletal X-rays (1,872 species), otoliths (1,387 species), COI gene sequences (2,047 pieces), and georeferenced data (230,000 records); all are made accessible online and constantly updated. Besides providing academic services to promote academic exchanges and raise research quality, the database also has popular science materials, underwater real-time monitoring, and marine conservation information so that it can contribute to the research, education, and management of marine resources. In the species checklist, all endemic, endangered (red list), invasive and extinct species were marked which could be used for species loss assessment and marine conservation use.

In 1994, we started a long-term partnership with the global FishBase and continue to actively collaborate with other international biodiversity databases and projects, including GBIF, COL, and EOL. We conduct cross-strait collaboration with China to exchange fish specimen data and establish a parallel list of traditional and simplified Chinese fish names. The repatriation of 228 type specimens of Taiwan fishes from more than ten institutions abroad is another achievement. Currently, the database has more than 500 thousands visits per month (including search engines), and is the only member of WDS that comes from Taiwan.

As to the value-added creations and applications, many educational materials, e.g. Taiwan Fish Multimedia Dictionary, Taiwan Fish Culture and Nature Knowledge Base, Intellectual Restaurant, Augmented Reality Knowledge Cards, e-books and e-magazines, Taiwan Seafood Guide, ichthyological terms and definitions, governmental fisheries statistics, and allowed/prohibited aquatic checklists had also been compiled. Also, a cell phone version of *The Fish Database of Taiwan* had been developed to conform to the trend of querying real-time data.

The next steps will be providing some fish-related cultural information as well as integrating the molecular identification data of fish eggs and juveniles in Taiwan waters, so that the early life history of Taiwan fishes could be understood more and further used for limiting fisheries, MPA, and resources administration.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