

Focus Group on Status and Trends and Red List Assessment Final Report

1. Relevant Aichi Biodiversity targets

- *Aichi Target 19 - Biodiversity Knowledge*
By 2020, knowledge, the science base and technologies relating to biodiversity, its values, functioning, status and trends, and the consequences of its loss, are improved, widely shared and transferred, and applied.
- *Aichi Target 12 - Preventing Extinction*
By 2020, the extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained.
- Other relevant Aichi Targets are 1 (Awareness of Biodiversity Values), 2 (Integration of Biodiversity Values), 5 (Loss of Habitats), 6 (Sustainable Fisheries), 7 (Areas under Sustainable Management), 8 (Pollution), 9 (Invasive Alien Species), 11 (Protected Areas), 14 (Essential Ecosystem Services) and 20 (Resource Mobilisation)

2. Leaders

- Dr Michael Lau (WWF-HK) and Prof. Yvonne Sadovy (HKU)

3. Key experts/stakeholders involved in the discussions

(a) Within the Steering Committee/Working Groups

- Dr Gary Ades (KFBG), Prof Put Ang Jr. (CUHK), Mr Simon Chan (AFCD), Dr Andy Cornish (WWF-International), Prof. David Dudgeon (HKU), Dr Billy Hau (HKU), Dr Roger Kendrick, Mr Kevin Laurie (Hong Kong Coast Watch), Ms Samantha Lee (WWF-HK), Ms Louise Li (AFCD), Dr Ng Cho Nam (HKU), Dr Paul Shin (City U), Mr Samson So (Eco Institute), Prof. Nora Tam (City U), Mr Tam Po Yiu, Dr Jackie Yip (AFCD)

(b) Outside the Steering Committee/Working Groups

- Mr John Allcock (WWF-HK), Ms Aidia Chan (AFCD), Mr Christophe Barthelemy, Mr Geoff Carey (AEC), Dr John Fellowes (KFBG), Dr Stephan Gale (KFBG), Dr David Gallacher (AECOM), Dr Leszek Karczmarski (HKU), Dr Pankaj Kumar (KFBG), Mr Paul Leader (AEC), Ms Janet Lee (AFCD), Dr Michael Leven (AEC), Ms Angie Ng (CA), Dr Ng Sai-chit (AFCD), Mr Tony Nip (KFBG), Mr Stan Shea, Ms Shadow Sin (OPCF), Ms Ivy So (AFCD), Mr Ray So, Dr Sung Yik Hei (KFBG), Dr Alvin Tang (Muni Arborist Ltd), Dr Allen To (WWF-HK), Mr Yu Yat Tung (HKBWS)

4. A brief summary of the FG meetings and taxonomic sub-groups formed

- A total of five FG meetings were held (23 Oct 2013, 27 Jan 2014, 29 Apr 2014, 3 July 2014, 12 Aug 2014).
- Ten taxonomic sub-groups (plants, fungi, terrestrial mammals, marine mammals, birds, herpetofauna, marine fish, freshwater fish, insects, marine living fossils) formed with participation of more external experts

(please refer to sub-group reports in the Appendix for the list of members)

5. Aim and Objectives

To prevent biodiversity loss in Hong Kong through

- better understanding of species status, trends and threats, and sharing of information and knowledge
- identification of threatened species through Hong Kong red list assessments conducted on a subset of species by taxon expert groups. These assessments will be conducted using the framework that will be used for development of the full Hong Kong Red List and the List of Species of Conservation Concern in future, once resources become available
- recommendations on how to enhance data sharing
- recommendations of conservation measures, management and monitoring for priority species among the assessed subset
- identification of knowledge gaps to guide future studies, assessments and monitoring

6. Scope

To take stock of the existing information on and examine the status and trends of local biodiversity, discuss and conduct data sharing. Also to develop a framework for assessing Hong Kong species of conservation concern, identify key data gaps and threats, and undertake such assessment whenever appropriate. Both terrestrial and marine biodiversity will be considered.

7. Methodology

- Stock take was carried out on existing databases, publications, reports and relevant studies. How to enhance data sharing and make reports available were discussed and recommendations made.
- Ten taxonomic sub-groups were formed, involving a wider pool of experts. Red List Assessments, general status, knowledge gaps, threats and recommended actions for priority species in each taxonomic group was discussed among the sub-groups.
- The applicability of Red List criteria in assessing conservation status of a range of species in Hong Kong was tested. Assessment of selected species (all native birds and amphibians; selected plants, mammals, reptiles, freshwater fish, marine fish, some insects and marine living fossils) using Red List criteria and with reference to the Guidelines for Application of IUCN Red List Criteria at Regional and National Levels was undertaken. Relevant information was documented using a standardized template similar to that of IUCN. This ensures a consistent and transparent format for data collection, and prompts assessors to consider all classes of information. All data and information sources used are fully referenced and should be available for public access except those that are sensitive.
- The framework for identifying Species of Conservation Concern was agreed to be based on the global (IUCN Red List), regional (China Red List, 2004)

and local (Hong Kong Red List) assessments. Species that are threatened in any of the three levels should be put on the list.

- Communications with other FGs were made on issues and recommendations that are linked to their work.

8. Brief Account of Hong Kong's existing status (please refer to the taxon sub-group reports in the Appendixes for a more detailed account)

Despite its very small size and dense human population, Hong Kong has exceptionally rich fauna and flora and lies within the Indo-Burma Hotspot, one of 35 global biodiversity hotspots known. Hong Kong is also a Key Biodiversity Area within the hotspot, meaning it is of extra-high conservation priority. Much research and monitoring have been carried out on the terrestrial plants and vertebrates, with field and laboratory research also being conducted on a range of marine fishes and invertebrates and on a few marine mammals. Studies have also been carried out to investigate the ecology of local freshwater organisms, but the taxonomy of some of them is not well understood. Generally, however, invertebrates are relatively less studied with the exception of a few taxon groups even though they are of much higher species diversity.

The main threat to the plant and terrestrial animal species is habitat loss and degradation caused by development in which lowland species are particularly susceptible. Some plant and animal species of high commercial value are hunted or used commercially and drastic declines have been observed in several species, including some protected species. Invasive freshwater fish species are impacting lowland freshwater communities.

About 40% of Hong Kong land area is protected as Country Parks, which covers most of Hong Kong's native forests, sizable areas of shrubland and grassland and many hill streams. However, lowland habitats, in particular freshwater marshes, rivers and *fung shui* woods, are under-represented in the protected area system. SSSI and conservation zonings in land use planning maps provide some degree of protection against development threats. Yet, illegal dumping, land filling, land clearing, channelization, illegal discharge of sewage and haphazard development are still prevailing, which lead to habitat loss and degradation.

Certain animal and plant species are protected by law but the list is biased towards land vertebrates. The Hong Kong protected species list needs to be revised as many species of high conservation concern are omitted.

Marine biodiversity is high with over 1,000 marine fishes, thousands of invertebrates and more coral species than the Caribbean. Overfishing and habitat damage (reclamation and pollution) however have affected many species. The Fisheries Protection Ordinance prohibits destructive fishing practices including use of toxic substances, dynamite, electricity,

dredging and suction. It has also banned trawling activities since 2012. Various fisheries management measures in fisheries have been rolled out (MBWG Paper 03/2013). There is no legislation to protect threatened marine fishes or invertebrates. The Chinese White Dolphin is undergoing declines and in need of better protection as there is a continuous reduction in its habitat and food sources.

9. Gaps identified

- Many invertebrate groups and fungi are under-studied. Some need their taxonomy to be sorted out while others lack territory-wide surveys so that basic information such as their distribution and any changes over time in Hong Kong is unclear (with the rarest species typically the least known).
- Some groups were studied in the past but not recently (e.g. land snails), so their current status is not well known or not known at all.
- Lowland species occurring in freshwater marsh and low gradient rivers are under-represented in the existing protected area system.
- Marine protected areas only cover a small proportion of Hong Kong waters and many species and communities are under-represented or not represented in the protected area system.
- Existing protected species lists are highly biased towards certain groups and those that are under threat from direct exploitation. Many species thought to be or known to be of conservation concern are not on the lists.
- Species action plans and targeted research are needed for some high priority species.
- Marine fishes and marine invertebrates are not on any protected species lists due to absence of appropriate legislation. Nonetheless, several have severely reduced populations, some will be threatened if no action is taken, and require some form of protection.
- Data on the status of many marine species are few and efforts should be directed toward selected species that might reasonably be expected to be of concern. Data on fisheries status are particularly sparse.

10. Recommended Strategy, Actions and Expected Outcome

A. Status Assessment

Red List

- The status of species in Hong Kong should be assessed using IUCN Red List criteria and the guidelines for regional assessment. Appropriate documentation of the information, as in a Global Assessment, is essential and should be treated as part of the Assessment. Groups that have adequate existing information and are under serious threats, such as freshwater fish and commercial marine fish, should be assessed as soon as possible. Species that are known to be threatened globally/regionally, restricted or rare, should also be a priority for assessment.
- The assessment should be reviewed regularly (at intervals not greater than 10 years and more frequently as necessary), as the status of some species is

likely to change. The Hong Kong Red List Assessment should be submitted to IUCN and recognized as a formal regional assessment when the appropriate platform is set up.

Species of Conservation Concern List

- A list of Species of Conservation Concern (SCC) should be developed guided by the local (HK Red List), regional (China Red List) and global (IUCN Red List) status. The SCC would inform EIA, planning procedures and the legislation related to wildlife protection etc. Species that are threatened in any of the three levels should meet the criteria and be placed on the list.

Contribution to Aichi Targets

- Aichi Target 19, Biodiversity Knowledge – knowledge of the status and trends of biodiversity will be improved through assimilating existing information and conducting species assessment using the well tested and widely accepted IUCN criteria. The Red List, and SCC and the basic information captured in the documentation can be easily shared with society (Aichi Target 1) and be referred to and applied in EIA, land use planning etc.

Outcome

- A science-based Red List and SCC will be produced together with all the relevant information on conservation status. The lists will provide an objective guide on the conservation importance of the species concerned and will help in making decisions in EIA, SEA, planning applications and conservation actions.

B. Data Sharing (full report in Appendix 11 “Data-Sharing and Access Report”)

- AFCD should develop/establish some form of database/centralized archive on Hong Kong biodiversity to pull together the wide range of materials, reports, data, studies, etc. that have been completed, already published, etc. To be considered first are those held by AFCD and other publicly-funded studies. PDF copies of releasable reports should ultimately be made available to ensure access to completed studies, as well as reports of historical interest, and compilations of titles of available reports be posted on-line to increase awareness of government work. There are a number of databases held in other countries that could be useful as reference examples.
- There is considerable expertise on biodiversity in Hong Kong which is little-tapped and could greatly assist the government, limited as it is in resources in this area, on species information, interpretation of past taxonomy, phenology, threats, assessments, survey designs, data analysis, etc. AFCD should proactively seek advice from them. The current BSAP process has done much to bring these experts together and it would be a positive step for government to continue to engage experts more broadly in

their (government) work and consultations. Hong Kong is a small place and it cannot be assumed that the government can maintain a full expertise among its full-time staff across all taxa and environmental issues.

- Considerable data are collected by AFCD. While the findings of some are published through a number of channels such as newsletters, papers, reports etc much of it is not, evidently, readily available to the public conservation community, or has not been updated, or data have not been organized/analysed/archived to be readily available to the public. In some cases, data release, is restricted under contract with researchers, is inconsistent/incomplete or insufficiently detailed to ensure transparency and to be useful for assessments. Guidelines should be developed to improve data management, release and access which deal with these issues.
- There is a need to clarify the issue of data 'sensitivity'. Generally speaking, highly sensitive, mainly spatial, data should not be released to the public and should only be circulated among relevant officers in the authorities and relevant experts/ scholars. A mechanism should be established that relevant expert(s) should be consulted before releasing the information especially in cases that the information is indeed provided by the expert(s).
- For raw data considered non-releasable, summaries or publications covering methodology and data analysis (such as a more detailed version of the AFCD newsletter Hong Kong Biodiversity) should be produced to make information available on all taxa studied in a form useful enough to advance understanding of the species, or habitat. While this occurs for some taxa, it does not occur for all (such as marine fishes or fisheries). Information from Marine Protected Areas and Artificial Reef studies from the last decade, for example, should be made available in more detail than is currently the case.
- There is a shortage of available information on marine species, and their fisheries, that needs to be addressed taking into account the large number of marine species that make up a considerable part of Hong Kong's biodiversity. AFCD should conduct more studies on species of commercial importance in relation to sustainable management and encourage/fund academics to conduct more research on local species.
- It is necessary to complete data compilation in Hong Kong and conduct further local Red List assessments, with initial priority on identified unassessed species of concern.
- A list of the ongoing significant monitoring and/or surveys of natural resources by AFCD including objectives, methodology and geographic coverage should be compiled and released publicly across all taxa studied. While some studies are available, others are not yet available in sufficient detail, for example, for red listing (e.g. (dragonfly and butterfly). Data analysis

and compilation of full report should be built into such studies which will be released when completed.

- Ecological data received by AFCD using ECF and other relevant studies should be assessed (for their accuracy) and centralised. Sometimes these studies/ reports provide updated and valuable data. As one example, the HKU Biodiversity Survey data has been incorporated into the AFCD departmental GIS. However, other studies might also be highly relevant to the current BSAP process, for example, surveys on horseshoe crabs and amphioxus, from which data could be extracted and made available, along with other studies (e.g., ecological monitoring).
- To action many of the identified items above, there is a need for resources; however, consideration should also be made regarding what can and should be accomplished without additional funding.

Contribution to Aichi Targets

- Aichi Target 19, Biodiversity Knowledge – knowledge of the status and trends of biodiversity will be improved through assimilating and sharing existing information.

Outcome

- A centralized archive/database will be established and knowledge on Hong Kong biodiversity will be improved and shared that will allow better species assessment and conservation planning.

C. Terrestrial Species Section

C.1. Studies to fill priority knowledge gaps

Plants

- To initiate a study to develop up-to-date mapping of vegetation cover, and to monitor the status and trends of habitats. The study can also include information on habitat connectivity and existence of corridors connecting different habitats.
- To study species of ecological importance, e.g. trends and interaction of pollinators.
- Conditions of vegetation in *fung shui* woods and freshwater wetlands need to be monitored, given the lack of updated data and knowledge of the known threats.

Mammals

- All species that have been categorized as Data Deficient (DD) or NA (Not Applicable for presumed vagrant species) should receive further studies to determine their status in Hong Kong. This will include further DNA work for mammals that form species complexes and more intense surveys of islands and sea caves.

- Detailed study should be carried out to determine the range, preferred habitat and ecological requirements (including diet) of the Chinese Pangolin and Eurasian Otter so that conservation measures can be optimised.

Birds

- To study the bird community and the types, locations, ecological value of different grassland habitats to determine the degree of threat, the distribution and abundance of species and the conservation actions needed.
- To launch long-term, territory-wide survey programmes using standardised methodology for the land bird communities in order to gather quantitative data that can be compared between sites/habitats/years and will facilitate future Red List assessment.
- More detailed research into numbers and habitat preferences of threatened wetland associated passerines such as Styan's Grasshopper Warbler and Manchurian Reed Warbler for which the Deep Bay area may be of significance as a stop-over or wintering site.

Reptiles

The status of many rare, restricted and/or endemic species is still not clear.

Therefore, future surveys/monitoring should be targeted towards the following:

- The status of *Dendrelaphis hollinrakei* and *Ahaetulla prasina medioxima* needs to be clarified by carrying out more surveys in Shek Kwu Chau and working closely with the organization managing the island.
- More field surveys should be undertaken in the Keung Shan area on Lantau in order to find more specimens of the documented unidentified snake, followed by taxonomic study, so that the species can be identified.
- More targeted field surveys for little-known and highly restricted species such as *Plestiodon tamdaoensis*, *Typhlops lazelli* and *Ramphotyphlops albiceps* to find out their distribution, habitat use and ecology so that appropriate conservation actions can be designed and implemented.
- More surveys on seldom-covered areas that may support rare species, including lowland forests on Hong Kong Island, Lantau Island and small remote offshore islands.
- The taxonomy of Tree Gecko *Hemiphyllodactylus* sp. requires clarification.
- Genetics of reptile species should be studied to aid taxonomy and to better understand population genetics and genetic diversity.

Amphibians

- Population genetics of the fragmented populations of Three-striped Grass Frog *Hylarana macrodactyla* and Two-striped Grass Frog *H. taipehensis* should be studied.
- In view of the large amount of existing data available, ongoing and future monitoring/surveys should be targeted towards answering specific questions that can help guide conservation, with regular analysis and dissemination of findings built into such a programme. Some examples are (1) targeted surveys

to find out the distribution of South China Cascade Frog; (2) the impact on amphibians and their habitats of mosquito control measures such as oiling, removal of boulders to straighten the stream course and the removal of trees on stream banks in hill streams.

Freshwater Fish

- A long-term, territory-wide and systematic monitoring/survey programme, using standardised methodology, should be launched in order to gather quantitative data that can be compared between sites, habitats and years and which will facilitate future Red List assessment. The survey programme should cover areas that have received little survey effort in the past (e.g. western New Territories, Frontier Closed Area).
- Fish hotspots should be regularly monitored (more frequently than the routine monitoring mentioned above) to record trends in target species and their habitat condition; this can help the conservation authorities gather up-to-date data, formulate necessary actions and make informed decisions (e.g. balancing development and conservation).
- The spread and impacts of alien fish species (e.g. North African Catfish, exotic snakeheads, poeciliids, tilapias) on native fish species should be studied and monitored.

Insects

Ants

- Conduct a review and update the identification of Hong Kong ants.
- Improved mapping of ant assemblages, using up-to-date spatial analysis tools, so as to understand differences between habitats, elevation and aspect and respond to trends in ant biodiversity (including the impact of invasive species), as a surrogate for terrestrial invertebrates as a whole.

Aculeate Hymenoptera (except ants)

- Increase our knowledge of the local aculeate fauna by implementing a consolidated survey and monitoring programme among the various stakeholders such as AFCD, NGOs and individuals on a suite of taxa selected based on available resources and local knowledge.

Fungi

- Conduct surveys on macrofungal diversity to answer fundamental questions relevant to ecosystem functioning, such as the prevalence, diversity and phenology of pathogenic, mycorrhizal and saprotrophic fungi. A comprehensive survey is recommended to start in Tai Po Kau Nature Reserve and the more ecologically-intact *fung shui* woods (e.g. Mui Tsz Lam). Mycorrhizal fungi such as *Boletus*, *Russula* or *Lactarius* are recommended to be priority genera for study. These genera have tight plant-fungus association, are sensitive to disturbance and are potential candidates for indicator species of forest quality. After such study, flagship species may be identified for fungal conservation.

Contribution to Aichi Targets

- Aichi Target 19, Biodiversity Knowledge – knowledge on Hong Kong biodiversity, its status and trends and functioning will be improved by review, targeted surveys/monitoring and ecological, genetics and taxonomic studies.

Outcome

- The biological diversity of Hong Kong will be better understood, especially for some of the under-studied groups and rare and little-known species. This knowledge can then be applied in conservation and development planning, used in identifying key knowledge gaps for future study and in raising awareness on Hong Kong biodiversity and its values.

C.2. Building up Capacity to Study Biodiversity

- There is currently very little information on algae, lower plants such as bryophytes, lichens, many invertebrate groups such as spiders, land snails, many insects, etc. More training and exchange to build up local expertise/capacity is needed, and studies should be encouraged. This would require more support to the local academic institutes to encourage and fund more ecological studies.

Contribution to Aichi Targets

- Aichi Target 19, Biodiversity Knowledge – building up local expertise will help to gather knowledge on those components of Hong Kong biodiversity that have been little studied.

Outcome

- The local biodiversity expertise base will be significantly increased and will cover more taxonomic groups. This will lead to the better understanding of Hong Kong biodiversity, especially for some of the under-studied groups and rare and little-known species. This knowledge can then be applied in conservation and development planning, used in identifying key knowledge gaps for future studies and in raising awareness on Hong Kong biodiversity and its values.

C.3. Addressing Major Threats

Habitat Destruction and Degradation

- Habitat destruction/degradation is among the main driving forces of biodiversity loss and has contributed to the local extinction of some species (e.g. Lin's Minnow, White Cloud Mountain Minnow, Rough-skinned Floating Frog). This is, however, a complicated issue, especially in a small place like Hong Kong, as there are always many different needs from different sectors of the society (e.g., building of small houses in rural areas). Measures to address this issue will be fully discussed in the reports of other Focus Groups (e.g. Terrestrial Habitat Focus Group) and thus will not be discussed further here.

Poaching

- High vigilance should be maintained regarding poaching/collecting activities targeting species of high commercial value, such as Incense Tree, Chinese Pangolin, freshwater turtles, orchids and certain freshwater fishes. It will be necessary to show a frequent but unpredictable presence in hotspots which might face poaching pressures. Also signage and appropriate fencing might be required, combined with regular patrolling.
- Setting up of a Wildlife Crime Unit/Task Force is recommended and has been raised in the Legislation Focus Group. The unit would possess tracking and investigative skills and can follow through cases of poaching and other organised wildlife crime activities in order to tackle the whole syndicate, rather than catching the odd poachers. Close interdepartmental collaboration, and working with Mainland/overseas police, Interpol and specialised NGOs, is needed, along with the use of the most sophisticated intelligence-gathering techniques such as DNA forensics. This requires a serious commitment to succeed.
- More serious penalties for wildlife crimes including smuggling should be considered in order to have a deterrent effect. Presently many prosecutions result in short incarceration terms and involve fines that are a significantly small percentage of the actual monetary rewards the criminal can gain through the illegal trade.
- The Wildlife Crime Unit and other Government officers require a proactive approach to anticipate trends in crimes and frequent analysis of trade and confiscation data, since the trade can change very quickly in response to species status, market demand and loophole emergence.

Invasive Species

- Gather more information and carry out monitoring of invasive alien plant and animal species to understand their ecological impact and how to control/eradicate them.
- The exotic Green House Frog (*Eleutherodactylus planirostris*) has established in Hong Kong and is spreading. Impacts on native amphibian fauna by this exotic frog should be studied.
- The invasive North African Catfish (*Clarias gariepinus*), exotic snakeheads (*Channa* spp.), various cichlids and various poeciliids are threatening all aquatic life (fish and invertebrates), including those living underwater temporarily (e.g., dragonflies, frogs). Some studies have already shown the ecological impacts of these species (e.g., the predation on the tadpoles of Romer's Tree Frog by the invasive Mosquito Fish *Gambusia* sp.). Plans should be formulated to eliminate or control these species from the aquatic environments.
- Urgent action, which may involve legislation and/or executive means, should be undertaken to address the unregulated release of exotic species, and the

unregulated importation of invasive species through the pet trade or for the aquaculture business. Plans to remove invasive species should also be formulated.

- The impact of known alien invasive species, notably *Solenopsis invicta*, should be studied as a matter of urgency so as to evaluate and monitor the threat to native invertebrates and other biota. Hong Kong should work with other Asian countries and their governments to minimise the risk of further spread of *S. invicta* and other highly invasive species.

Water Pollution

- In places where it is not possible for residences to connect to the communal sewerage system (e.g. enclaves surrounded by country parks), the planning/land use authority should limit the development potential in these areas: not allow houses to be built along the riparian zone, and strictly limit the number of houses within each catchment area.
- DSD and the EPD should investigate how to extend the communal sewerage system to remote villages in order to solve the stream/river pollution problem and take steps to increase the connection rate of private sewerages to communal sewers.
- For large-scale development proposals like “the Development of the Tung Chung Remaining Area” and those NDAs, relevant authorities should explore innovative ways to collect and discharge surface runoff so as not to cause water pollution to nearby streams.
- The effectiveness of the Water Pollution Control Ordinance in relation to stream/river pollution should be reviewed.

Rivers/streams Channelisation

- Stream channelisation should be avoided wherever possible. If channelisation is proven to be necessary, the channel should be designed in an eco-friendly way. All relevant departments and Environmental NGOs should liaise with each other for each project as mitigation measures can be highly site-specific. In addition, a formal liaison mechanism regarding channelisation and stream maintenance works should be established. Informal liaison is already ongoing between DSD and Environmental NGOs, and this should be formalized and the membership expanded to include AFCD, etc.

Contribution to Aichi Targets

- Aichi Target 1 Awareness of Biodiversity Values – Through studying and tackling the major threats to biodiversity and employing means to share knowledge with the community, citizens will be made aware of the value of biodiversity and what actions can be taken to conserve biodiversity.
- Aichi Target 2 Integration of Biodiversity Values – Biodiversity values and their conservation will be integrated into government policy, planning and practices.
- Aichi Target 5 Loss of Habitat – Loss of lowland streams/ivers will be reduced through addressing channelization.

- Aichi Target 8 Pollution – Pollution to rivers and streams will be reduced.
- Aichi Target 9 Alien Species – Impacts and spread of invasive alien species will be better understood to allow more informed decisions regarding their control and eradication.
- Aichi Target 12 Preventing Extinction – Highly valuable species threatened by illegal collecting/poaching will receive more protection.
- Aichi Target 14 Essential Ecosystem Services – River/stream ecosystem will be better safeguarded.

Outcome

- The status of highly threatened, commercially valuable species and rivers/streams will be improved through tackling the main threats. The impacts and spread of many invasive species in Hong Kong will be better known and efforts will be targeted to control those having serious effects.

C.4. Conservation Actions for Priority Species

Plants

- Priority species: Incense Tree *Aquilaria sinensis* and highly threatened orchid species. Urgent enforcement and conservation actions are needed.

Mammals

- Priority Species: Chinese Pangolin, Crab-eating Mongoose, and Eurasian Otter. Provide conservation zoning for the key sites of these priority species when they are identified. Reduce development pressure in Country Park enclaves, in particular those in NENT, to where Crab-eating Mongoose is restricted locally. Increase connectivity between country parks by establishing and enhancing 'wildlife corridors'. The ecological needs of Eurasian Otter and its conservation should be considered in the holistic planning of Deep Bay wetlands and urgent action should be undertaken to limit the development pressure there.
- Develop a priority list of bat hibernacula, maternity roosts and major roosts. Important mines and caves should receive protection by simply gating or grilling (with locks to allow access by researchers) the mine or tunnel entrances. Lin Ma Hang mines which are already in a special area (SSSI) should be further protected in this way, as should Lin Fa Shan mines in Tai Lam Country Park. Several other important roosts have been discovered by the AFCD Mammal Group and these should also be considered. Fencing should be provided to prevent access to water catchment tunnels which serve as important bat roosts. Long term bat population monitoring should be conducted or continued for any key sites identified.

Birds

- Priority Species: Chinese Grassbird, Collared Crow. Breeding and important foraging areas and/or roost sites should be protected.
- Priority Group: Water birds and farmland birds. The two 'Management Agreement' projects targeting these species funded by Environment and Conservation Fund have been shown to increase the abundance and diversity of the bird community. The land area of wetland habitats (in particular reed marsh, freshwater marsh and wet agriculture) under active habitat management for bird conservation (and other wildlife) should be expanded.

Reptiles

- Known sites supporting the rare endemic reptiles should be protected by incorporating them into country parks, special areas or covered by SSSI or Conservation Area.

Amphibians

- A reintroduction programme for the Rough-skinned Floating Frog *Occidozyga lima*, which disappeared from Hong Kong in the 1990s, should be undertaken. First a good-sized rice paddy should be established and secured in a protected area. This habitat, if managed well, will benefit not only this species but also a suite of others while reviving a centuries-old sustainable land use.

Freshwater Fishes

- Priority Species:

| <u>Priority</u> | <u>Species (with local Red List category)</u> |
|-----------------|--|
| Very high | <i>Acrossocheilus parallens</i> Thick-lipped Barb (CR), <i>Anguilla japonica</i> Japanese Eel (EN), <i>Glyptothorax pallozonus</i> (CR), <i>Plecoglossus altivelis</i> Ayu Sweetfish (CR), <i>Pseudobagrus trilineatus</i> (CR), <i>Rasbora steineri</i> Chinese Rasbora (CR), <i>Stiphodon imperorientis</i> Akihito Neon Goby (CR), <i>Stiphodon multisquamus</i> Scaly Neon Goby (EN) |
| High | <i>Acrossocheilus beijiangensis</i> Beijiang Thick-lipped Barb (EN), <i>Anguilla marmorata</i> Giant Marbled Eel (NT), <i>Awaous melanocephalus</i> Largesnout Goby (VU), <i>Clarias fuscus</i> White-spotted Walking Catfish (NT), <i>Kuhlia marginata</i> Spotted Flagtail (VU), <i>Kuhlia rupestris</i> Rock Flagtail (VU), <i>Macropodus hongkongensis</i> Hong Kong Paradise Fish (NT), <i>Macropodus opercularis</i> Paradise Fish (EN), <i>Mastacembelus armatus</i> Zig-zag Eel (VU), <i>Metzia formosae</i> Taiwan Lesser Beam (VU), <i>Metzia lineata</i> Lesser Beam (VU), <i>Oryzias curvinotus</i> Rice Fish (VU), <i>Rhodeus ocellatus</i> Rose Bitterling (VU), <i>Schistura incerta</i> Inmacular Loach (VU), <i>Stiphodon atropurpureus</i> Purple Neon Goby (VU) |
| Moderate | <i>Channa asiatica</i> Small Snakehead (NT), <i>Rhinogobius leavelli</i> Li's Goby (VU) |

Freshwater Fishes: In-situ Habitat Protection

- Rivers, streams and marshes (except hill streams) are usually under-represented in country parks and are threatened by many different developments. Streams, rivers, marshes and other water bodies important to fishes, and the surrounding riparian zones, should be identified and protected by incorporating them into Country Parks/ Special Areas. Water bodies and their surrounding areas already known to be important to fishes, but not yet appropriately protected, should be preserved urgently.
- Aquatic habitats such as streams, marshes and ponds within Country Park Enclaves, and their riparian zones, should be adequately protected by effective conservation zonings (i.e., Country Park, Special Area, SSSI, Conservation Area, Coastal Protection Area, Green Belt (1)) as many of them are important to fishes of conservation concern.
- Many Ecologically Important Streams (EISs) are important to fishes of conservation concern. Appropriate and enforceable zoning plans/protection measures should be put in place for existing and suggested Ecologically Important Streams (EISs) and their riparian zones especially for those currently not covered by any enforceable zoning plans (e.g., Tung Chung, Pui O, Sham Wat) or outside protected areas. If possible, these water bodies and their riparian zones should be incorporated into the country park system also.
- The EIS list should be revised as soon as possible, preferably within this year, and the freshwater fish Red List should also be finalised as soon as possible to guide the formulation of land use plans and development proposals, as well as development decisions to safeguard fishes and their habitats.
- In the planning of the protective zonings, a holistic view should be applied as many diadromous species appear in these areas and the whole stretch of the watercourse (e.g., from the estuarine area to the upper section) should be protected.
- In large-scale development projects such as NENT NDA, North NT NDA, Yuen Long South NDA, etc., natural streams/ semi-natural streams/ freshwater marshes should be protected as far as possible through appropriate land use planning (i.e., integrating natural streams, rivers and riparian zones with new town development through appropriate land use designation, urban design, and drainage management to maintain their biodiversity value and outlook).

Freshwater Fishes: Habitat Management

- Minor river/ stream maintenance works (e.g. desilting, weeding, removal of stones in streams) are having significant impacts on streams. The conservation authorities, in consultation with Environmental NGOs and local experts, should formulate guidelines and give suggestions to the relevant department to follow, so as to improve these works and minimize ecological impacts.
- Important stream/ aquatic habitats and their water quality, as well as species of conservation concern, should be regularly monitored.
- Environmental flow regimes for Hong Kong streams (i.e., a minimum flow that must be maintained below water extraction points so that the capacity of the downstream habitat to support fishes (or other organisms) is not impaired by

water extraction) should be established and implemented. This would require the use of eco-hydrological relationships to determine the amount of water that can be extracted in each season (dry vs wet) in order to ensure that downstream communities of native species are not compromised. This measure would need to be accompanied by restriction and enforcement of controls upon informal and unregulated extraction of water from streams by any parties other than the authorities.

Freshwater Fishes: Species Management

- All freshwater fish species of conservation concern should be included in the Wild Animal Protection Ordinance to control capture and prevent over-exploitation. It also ensures that these species will be considered when the potential environmental impacts of development projects are assessed.
- The conservation authorities, in consultation with Environmental NGOs, local experts etc., should start developing species-specific action plans and the feasibility or desirability of conservation interventions such as habitat restoration including channelized stream/river sections, relocation, translocation, and *ex situ* breeding facilities for highly threatened species. The last of these actions may be an important 'avenue of last resort' if gravely threatened fishes (e.g., Chinese Rasbora, Taiwan Lesser Beam, Rose Bitterling) present at only one or a few localities are in danger of becoming locally extinct.

Insects

Moths

- A generic action plan for all the moth species of conservation concern should be prepared, with actions implemented to identify (i) the life histories (hence habitat needs) of, (ii) distributions of, (iii) population ecology of, and (iv) threats to all the species of conservation concern. Where necessary, immediate action should be taken to rectify / negate any threats likely to result in major decline or extinction of a species, or to increase the population of species with low population to a state where it is no longer at severe risk of extinction; such actions may include habitat protection, habitat restoration, in-situ or even ex-situ population restoration. Monitoring of all species of conservation concern should be undertaken in order to establish the population trends. This overall action plan should be reviewed with the review of the HKSAR BSAP and revised as necessary, including species specific action plans where and when appropriate.

Odonata

- Priority species: *Gomphidia kelloggi* (EN); *Macromia katae*, *Orthetrum poecilops* (VU); *Mortonagrion Hirosei* (NT); *Cephalaeschna klotsi*, *Ophiogomphus sinicus*, *Sieboldius alexanderi* (DD); *Leptogomphus hongkongensis* (endemic to Hong Kong); any other species that will be assessed as Near Threatened or Threatened. In addition, *Agriomorpha fusca*, although assessed as LC, is the only species in its genus and is restricted to

one country (China) and thereby meets one of the sets of criteria for conservation priority species defined by the IUCN Odonata Specialist Group (Moore, 1997).

- Species-specific conservation recommendations should be prepared for all the priority species, involving, where appropriate, prescriptions for study of specific habitat requirements and species distribution. In addition, a general dragonfly action plan should be drafted, focusing particularly on identifying species that, while not on the IUCN Red List, are locally rare and their Hong Kong populations potentially threatened. Monitoring of all species of conservation concern should be undertaken in order to establish population trends. This overall action plan should be reviewed with the review of the HKSAR BSAP and revised as necessary.
- Wilson (1997) listed 23 key Hong Kong dragonfly sites, of which he considered eight to merit "protection and official recognition". These outstanding sites were: Luk Keng, Ma Tso Lung, Shuen Wan, River Jhelum, She Shan, Sha Lo Tung, Tai Tong, Nam Chung and Wu Kau Tang. It is recommended that all these unprotected sites should be surveyed and those confirmed to remain important should be actively conserved, as protected areas or co-managed areas of ecological production.
- Surveys of the other 15 key dragonfly sites identified by Wilson should also be undertaken to facilitate a review of the state of Hong Kong's dragonfly fauna and evaluate any changes in status in the last two decades.

Ants

- Following the precautionary principle, the known locations of species of concern should be protected.

Aculeate Hymenoptera (except ants)

- Where necessary, immediate action should be taken to rectify / negate any threats likely to result in major decline or extinction of a species, or if a species is already at a low population level, action should be taken to increase the population to a state where it is no longer at severe risk of extinction; such actions may include habitat protection, habitat restoration, in-situ or even ex-situ population restoration.
- To include the following 10 species (6.5% of the locally identified species) in the SCC list with a review of the status of each in five years:
 - *Eustenogaster nigra*
 - *Polistes gigas*
 - *Polistes strigosus*
 - *Polistes rothneyi grahami*
 - *Ropalidia fasciata*
 - *Ropalidia marginata*
 - *Vespa mandarinia*
 - *Vespa mocsaryana*

- *Calligaster himalayensis*
- *Amegilla fimbriata*
- To treat the following species as priority species and protect their known habitats:
 - *Ropalidia fasciata*
 - *Ropalidia marginata*
 - *Vespa mandarinia*
 - *Vespa mocsaryana*
 - *Calligaster himalayensis*
 - *Amegilla fimbriata*

Butterflies

- Priority Species: *Hasora vitta*, *Halpe pauper*, *Taractrocera maevius*, *Thoressa monastyrskyi*. These species should be given protection status.

Contribution to Aichi Targets

- Aichi Target 1 Awareness of Biodiversity Values – All the conservation actions will allow people to know more about the values of biodiversity and what actions can be taken to conserve them.
- Aichi Target 2 Integration of Biodiversity Values – Biodiversity values and their conservation will be integrated into government policy, planning and practices.
- Aichi Target 5 Loss of Habitat – Loss of key habitats will be reduced through better protection and planning.
- Aichi Target 7 Area Under Sustainable Management – Area under sustainable agriculture will be increased through the recreation of rice paddy.
- Aichi Target 11 Protected Area – The protected area network will be enhanced through better coverage, representativeness, management and connectivity.
- Aichi Target 12 Preventing Extinction – The extinction of highly threatened species will be prevented and the status of many declining species will be improved.
- Aichi Target 14 Essential Ecosystem Services – Essential ecosystem services will be safeguarded through better protection of freshwater and terrestrial habitats.

Outcome

- The status of many threatened and priority species will be improved through protection measures, better management and planning, habitat restoration and, conservation actions.

C.5. Species Action Plans for Species Highly Threatened Locally and Regionally/Globally

- Species Action Plans with clear conservation objectives and targets are

urgently needed for ten native orchids, the Chinese Pangolin, Eurasian Otter, and the three highly threatened stream turtles *Cuora trifasciata*, *Platysternon megacephalum* and *Sacalia bealei*. An expert group should be formed to formulate these action plans, oversee their implementation and review the action plans regularly.

Contribution to Aichi Targets

- Aichi Target 1 Awareness of Biodiversity Values – Formulating and implementing the species action plan will allow people to know more about the values of highly threaten species and what actions can be taken to conserve them.
- Aichi Target 2 Integration of Biodiversity Values – Values of highly threatened species and their conservation will be integrated into government policy, planning and practices.
- Aichi Target 5 Loss of Habitat – Loss of key habitats for the highly threatened species will be reduced through better protection and planning.
- Aichi Target Protected Area – The protected area network will be enhanced through better coverage, representativeness, management and/or connectivity.
- Aichi Target 12 Preventing Extinction – The extinction of highly threatened species will be prevented through comprehensive species action plan.
- Aichi Target 14 Essential Ecosystem Services – Essential ecosystem services will be safeguarded through better protection of the highly threatened species habitats.

Outcome

- The status of the highly threatened species will be improved through well-planned and proactive protection measures, management and conservation actions. Local extinctions will be prevented and factors contributing to population reductions will be identified and addressed early.

C.6. Regional Cooperation

- Since many bird species found in Hong Kong are migratory, conservation work undertaken in Hong Kong can be of higher effectiveness if regional conservation activities are well coordinated, planned and complementary to each other. Hong Kong should actively take part in regional and global conservation initiatives or collaborations for migratory birds and actively exchange information and experience with regional counterparts.
- Similarly Hong Kong should be actively engaged in the control of wildlife trade, and of invasive species, through exchange of information and actions with responsible authorities in other jurisdictions.

Contribution to Aichi Targets

- Aichi Target 1 Awareness of Biodiversity Values – Cooperation and sharing of

knowledge with regional counterparts will allow people to know more about the values of biodiversity and what actions can be taken to conserve them.

- Aichi Target 19 Biodiversity Knowledge – Biodiversity knowledge, its values, functioning, status and trend, and the consequences of its loss will be improved through collaboration and sharing between regional counterparts.

Outcome

- Biodiversity knowledge and experience in conservation and research will be widely shared in the region and applied in the conservation and study of the migratory bird fauna, as well as the control of wildlife trade and the spread of invasive species.

C.7. Resources

- Adequate funding and manpower should be allocated by the Hong Kong government to facilitate implementation of the above recommendations.
- Collaboration with tertiary institutions, Environmental NGOs, wildlife groups, businesses should be actively sought to make the effective use of available resources and even to generate more resources.

Contribution to Aichi Targets

- Aichi Target 1 Awareness of Biodiversity Values – Collaboration between different sectors will allow people to know more about the values of biodiversity and what actions can be taken to conserve them.
- Aichi Target 19 Biodiversity Knowledge – Biodiversity knowledge, its values, functioning, status and trend, and the consequences of its loss will be improved through collaboration and sharing between different stakeholders.
- Aichi Target 20 Resource Mobilisation – Financial resources will be mobilized to ensure the effective implementation of the recommendations.

Outcome

- The conservation, research and training actions recommended will be effectively implemented and the goals and objectives in the 1st BSAP will be fulfilled.

D. Marine Species Section (please refer to the supporting reports in the Appendixes and the species assessments for full details)

D.1. Introduction

To address the relevant Aichi targets, action is urgently needed to stem declines and aid recovery of several threatened marine species in Hong Kong waters. It is also necessary to move towards a more biologically sustainable approach to fisheries management by building on recently implemented measures, such as the trawling ban. Action in Hong Kong will be important for reducing threats to locally threatened species and for reducing/eliminating unsustainable fishing and other practices.

These can threaten species and greatly reduce the societal value from natural resources. Moreover, increasing attention is being paid to considering regional measures to address problems of threats and overfishing in the case of particularly mobile species. In the case of Hong Kong, regional engagement is particularly important to consider given the city's heavy involvement in international trade of marine species and the wide spatial reach of its fishing fleets and businesses. Moreover, international cooperation is increasingly discussed as a means of dealing with threats to species, and is also relevant to Hong Kong. All of these issues are relevant to the rich marine biodiversity of Hong Kong waters and its sustainable use.

Marine conservation lags far behind that of terrestrial conservation. Less than 2% of Hong Kong waters are marine parks and reserves compared with around 40% country park area and marine species of fishes and invertebrates are not even covered under wildlife protection legislation. Also, fishing on marine invertebrates has received far less attention even than fishes, and needs attention, e.g. lobster, octopus. These imbalances must be addressed through BSAP.

The following section identifies the relevant Aichi targets, highlights important species and habitat issues identified during marine species assessments, identifies possible actions for addressing species and related habitat and use concerns, looks at data and monitoring needs, and considers education.

D.2. Relevant Aichi targets

Target 6: By 2020 all fish and invertebrate stocks and aquatic plants are managed and harvested sustainably, legally and applying ecosystem based approaches, so that overfishing is avoided, recovery plans and measures are in place for all depleted species, fisheries have no significant adverse impacts on threatened species and vulnerable ecosystems and the impacts of fisheries on stocks, species and ecosystems are within safe ecological limits.

Target 12: By 2020 the extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained.

Target 9: By 2020, invasive alien species and pathways are identified and prioritized, priority species are controlled or eradicated and measures are in place to manage pathways to prevent their introduction and establishment.

In relation to the above targets and bearing in mind the outcomes of marine species assessments there are FOUR major areas for action urgently needed to protect and safeguard Hong Kong's marine heritage. These are given as i) to iv) below. The rest of the report covers issues and priorities identified in more detail and covers SPECIES, HABITAT, DATA AND RESEARCH NEEDED and EDUCATION:

- i) For the species most threatened by fishing (e.g. CR and EN), and for migratory species for which there are significant efforts being undertaken to conserve globally, like whale sharks, making them off-limits to fishing is needed to prevent their extinction. Species Action Plans should also be formulated for the most threatened species. This is conservative and might require collaborations, on behalf of a small number of species considered to be at very high risk for which action in Hong Kong is significant.
- ii) For species that are fished and have become depleted (these include VU species and those that emerge subsequently to be variously of concern but are not CR or EN), moving towards sustainable fisheries management is an appropriate approach to restoring populations and utilising them sustainably. This is a fisheries approach and requires measures to be taken that are not yet in place or planned for Hong Kong. Many such species will not be protected by simple measures such as control on engine power or MPAs and may need species-specific measures. There are many examples in other countries of species-specific protection that can be referred to as models.
- iii) Protected areas where fishing is not permitted at all, commercial nor recreational, provide a safeguard to conserving marine ecosystem biodiversity and need to cover examples of the range of key habitats present in Hong Kong's waters. They are also a safeguard in the eventuality that the move towards sustainable fisheries management does not benefit certain depleted species to the extent that they can recover, and to stem marine habitat loss and degradation. Such no-take areas are also an important fisheries management tool, and can assist in rebuilding depleted fisheries like that of HK's, by protecting breeding adults, and spawning and nursery grounds. Networks of MPAs covering the variety of habitat types found in HK are needed in order for this approach to have the best chance of succeeding.
- iv) In relation to the impacts of development, improving EIAs is a key way to ensure that efforts to conserve and sustainably utilise marine life are not undermined by development. Often associated with development are mitigation measures which need to be monitored and evaluated for their effectiveness in attaining stated mitigation objectives.

D.3. Species

PRIORITY: For those species considered to be threatened, attention is needed and a high priority should be assigned to seek practical measures to manage/conservate those species listed as endangered (EN) or critically endangered (CR). For species

that are yet to be regionally assessed (for Hong Kong) but which are considered as species of concern from other assessments, attempts to collect information or initiate relevant studies should be a high priority.

Species-specific protective measures for marine species are needed in line with the protection of other Hong Kong wildlife (refer also to the HKU report) which would legally require, among other relevant measures, release with accidental capture (e.g. this could have been used to address the accidental take of a whale shark, a globally threatened species, several years ago when it passed through Hong Kong and was taken in a net). Other measures such as minimum size controls for the target species, or controls on relevant gears, could also be applied. Whatever the approach, there is a need for measures to be established and enforced to protect species determined to be at high level of threat.

Species-specific measures could be introduced under Section 4 – Regulations – of the Fisheries Ordinance (Cap 171); the Chief Executive in Council may by regulation provide for (c) the prohibition or restriction of the taking of any variety of fish, or fish of any size, from the waters of Hong Kong; (d) the prohibition or restriction of the use of any specified kinds of net or of nets having a mesh of any specified size for the purpose of fishing; (g) the protection of spawning areas; (ga) the prohibition or restriction of the use of any apparatus of a class or description specified under paragraph (gb), for the purpose of fishing; and (h) generally, the protection or regulation of fishing. (Under the regulations, fish includes all forms of aquatic life and turtles). Use of marine resources is inclusive of fishing, scientific research, education and ecotourism.

For some species, controls on fishing activity might be necessary and should encompass both commercial and recreational fishing, as relevant. Examples that might require controls on spearfishing are some of the larger reef fish species which are a favoured target of spearfishermen. For some species, such as the red grouper, *Epinphelus akaara*, and blackspot tuskfish *Choerodon schoenleinii* minimum sizes could be controlled by limits on mesh sizes or release of undersize fish required. Gear or other fishing controls (e.g. times and/or places protected) may be necessary to reduce entanglement of immature individuals of threatened species, protect spawning or nursery areas. Bycatch reduction measures should be considered for species regularly associated with entanglement, such as the Chinese White Dolphin and the horseshoe crab; bycatch reduction measures for fisheries that take dolphin as incidental catch has been practiced variously elsewhere and could be explored in Hong Kong. The impact of recreational fishing on rocky habitat species is unknown but certainly the activity occurs in areas where there are threatened species and this

needs to be better understood (refer also to the Sustainable Use Focus Group Report).

PRIORITY: For species with relatively narrow geographic distributions of which Hong Kong is an important part, improved and effective local measures could be extremely important for the global status of the species. A clear example of this is the highly threatened Chinese Bahaba that only occurs in Hong Kong and nearby regional waters. Conservation actions in Hong Kong will be important for their recovery or to reduce the currently high chance of extinction. For such species, conservation action is urgently needed and is already in place in Mainland China. At the very least Hong Kong should consider compatible protective legislation. This species urgently needs a species action plan as it is likely to be close to global extinction.

There is a need to incorporate the consideration of regionally assessed threatened marine species routinely within EIA evaluations for development projects in Hong Kong and, moreover, ensure that any mitigation measures intended/required following development projects are not only carried out but also assessed for their effectiveness. When the government is providing comments on new development proposals, the work and land-use zoning plans that could affect the habitats of threatened species should be considered and the survival of highly threatened species given top priority in terms of planning and approach to development work conducted. EIAs have considered the impact of development on fisheries under EIA Ordinance. However, mitigation measures for loss of fisheries resources, such as the introduction of artificial reefs (ARs), have not been evaluated for effectiveness towards this objective and urgently need a review; there is no evidence in Hong Kong that ARs provide a net improvement to fisheries of any species and, moreover, may even increase fishing activity by concentrating fish coming in from nearby areas making them easier to catch.

In the case of species exploited in Hong Kong, or by Hong Kong fleets, for which there is conservation concern but a wide regional distribution, action by Hong Kong may also be relevant. For example, for certain species of larger sharks and rays, migrating fishes such as seabreams, and green turtle, regional actions or collaborations might be important for protection of biodiversity. This issue of the need for regional cooperation is increasingly under discussion globally. As an illustrative example is the development and implementation of management plans under the FAO International Plan of Action for the Conservation and Management of Sharks (IPOA-Sharks) which is already under development in the Asian region by Brunei Darussalam, Indonesia, Japan, Malaysia, Myanmar, Philippines, Singapore, Thailand and Vietnam. China has also indicated that it is involved in this process. The main aims of the IPOA-Sharks are to improve species-specific catch and landings data collection, and the monitoring

and management of shark fisheries taking account of its widespread movements, the need for a regional approach and the importance of country-specific actions.

D.4. Habitat

A significant threatening factor for a number of species of concern is loss of, or damage to, their habitat, including, for some species, key nursery or spawning areas. Under current legislation, there is much opportunity to build on the MPA system in Hong Kong by expanding on, and better connecting, protected areas currently in place. This could require incorporating a wider range of habitat types for protection to address species for which little or none of their habitat is protected (such as in western Hong Kong). Under Section 4A – Orders, The Secretary (Secretary for Food and Health) may, by order published in the Gazette, (a) designate any area of the waters of Hong Kong to be a fisheries protection area to promote the conservation and management of marine and fisheries resources. Note that destructive fishing activities have been prohibited under Fisheries Protection Ordinance (Cap.171).

Key considerations in relation to marine species biodiversity should be given to eliminating fishing (commercial and recreational) entirely within MPAs to ensure full protection of threatened species, as well as their habitat, from all fishing activities and to maintain areas for biodiversity build-up and conservation. This should also help to improve the coral habitat which health depends partly on associated faunal biodiversity (such as herbivores to reduce algal build-up and predators to reduce coral predators). Globally, targets for MPAs are in the region of 10-20% and HK should move to such global goals in the near term. The Aichi Target 11 is at least 10 per cent of coastal and marine areas.

Improved land use planning system should also be applied to prevent the impacts on coastal habitats from coastal developments. Greater habitat protection in reef areas could be achieved by establishing anchoring moorings for recreational boats, especially dive boats and yachts. We urge that official reclamation projects do not impact on important fish habitats (such as nurseries); note that the fisheries impacts arising from reclamation proposals, e.g. impact on fisheries habitats/spawning and nursery ground, are already assessed and evaluated in the statutory EIA process although little is known of these areas.

In the case of horseshoe crab, habitat loss or degradation poses major threats to their populations in Hong Kong. Most of Hong Kong's horseshoe crab spawning and nursery beaches are either situated next to population centres or are easily accessible and popular locations for a variety of activities including sunset viewing (Pak Nai/Ha Pak Nai), clam digging (Ha Pak Nai, Tung Chung Wan and Shui Hau Wan) and/or razor shell fishing with salt (Ha Pak Nai).

Mangroves, seagrass beds and intertidal mudflats are well known to be uncommon habitats in Hong Kong (see <https://www.afcd.gov.hk/english/conservation/hkbiodiversity/habitat/habitat.html> for their % coverage in Hong Kong). They are also considered to be important habitats under the TM-EIAO. These habitats can function as nurseries for many fish and invertebrate species, and they are also the habitats for many extra-ordinary marine species (e.g., sesarmine crabs, fiddler crabs) which can only be found in such areas. Unfortunately, many of these habitats were destroyed in the past due to urban expansion and many still face threats as they are often at the frontline of conflicts (1) pollution: many mangrove/ mudflats are at estuaries and thus receive pollutants discharged upstream (2) habitat destruction spreading of the dumped materials from land-based development, and (3) reclamation: nearly always appears at the water edge where these habitats occur. In view of the small areas of these habitats in Hong Kong, their destruction rate in the past and their disproportional ecological value, there is an urgent need for protection. Indeed, many intertidal areas (e.g., Pak Nai, Shui Hau, those mudflats in Tolo Harbour) have already been recommended for protection under the MPA system but are not yet appropriately protected.

Waters around many remote islands/ areas are important habitats for various marine creatures. For instance, the Ninepins are famous for a diverse soft coral community. Waters around some islands in the east (e.g., Sai Kung) are important habitats for corals (and associated species) and some of them also contain special habitats (e.g., areas with high coverage of anemone near Tsim Chau). Waters in some bays also contain globally unique assemblages (e.g., the benthic areas with high density of *Amphioxus* off Tai Long Wan and Pak Lap Wan). Currently, these areas are all not protected from man-made threats (e.g., pollution from land-based development, cage-fishing, gill-netting, damage from boat anchors, collection of organisms such as sea urchins). These unique habitats must be protected. Again, many of these areas were recommended for protection under the MPA system in past studies.

In the case of the Green Turtle, although the local nesting beach is now a Restricted Area, coastal waters next to beach have no protection. Since it is likely that adult turtles gather around in these waters to mate, as in other parts of the world, they would be vulnerable to disturbance from people, yachts, etc. Hence, the coastal waters around Sham Wan should be established as a Marine Park to better protect this very small remaining population.

PRIORITY In the case of the Chinese White Dolphin, there is a clear and urgent need for more and connected marine protected areas that could meaningfully facilitate dolphin conservation, reduce impacts with vessels, etc. The alarming rate of the

current population decline in this species highlights the urgency of the matter. A species action plan, that includes a broader network of properly placed (i.e. relevant to the species) protected areas across the Pearl River Estuary is essential and is another example where cooperation is needed in regions adjacent to Hong Kong in order to achieve conservation goals. Bio-accumulative persistent and newly emerging pollutants are rapidly accumulating following the rapid economic, industrialization and human population growth in the Delta. Important issues include sewage-discharge-control, sewage-reprocessing, and stricter standards for pollutant discharge to mitigate pollutant accumulation, through regional cooperation between Hong Kong and the Guangdong Province (for details refer to species assessment of the Chinese White Dolphin).

D.5. Data gaps/research needs/monitoring

PRIORITY: A strategy for monitoring marine species, especially commercially important or threatened species, in terms of biology, ecology, use and population trends, as well as identifying key habitats, such as spawning and nursery areas is needed. Such monitoring and research needs to be conducted in a consistent, scientifically based, and standardized way that encompasses long term data collection planning and monitoring to evaluate the effectiveness of introduced actions. Such monitoring can be selectively designed to address key species, issues and concerns. There are a number of modeling and fishery assessment approaches available for multi-species fisheries. For exploited species, monitoring should encompass all gear types that continue to be extensively used (including hook and line, gill nets, spear-fishing) (see report of Sustainable Use Focus Group). Indicator species of key interest (fishery importance, threatened) can also be used as a focus for data collection.

It should be noted that Hong Kong is a small place with relatively long coast line and a multispecies fisheries industry targeting a very diverse catch composition. The difficulties of enforcement and cost effectiveness of species-specific measures should not be underestimated and need to be evaluated. However, there are many fishery assessment tools available nowadays for multi-species and data-poor fisheries and these could be explored and adapted to Hong Kong. The dearth of fishery data in general (on exploited species and also on fishing effort by gear type and over time, etc.) is noteworthy and urgently needs to be addressed. For sustainable fisheries, marine resources must have sustainably functioning populations and this is not possible without long-term, consistent, study and appropriate action. This aspect of science in Hong Kong is seriously lacking.

PRIORITY There is clearly a need to conduct research on species of actual or suspected conservation concern. AFCD research addresses a number of terrestrial

species but research on marine species, with the notable exception of the Chinese White Dolphin is almost absent (see Hong Kong Biodiversity Newsletters and available reports on the AFCD website). There were some studies on intertidal/mangrove species like sesarmin crabs, fiddler crabs, mudskippers, molluscs, etc., by the AFCD and there were also some studies funded by the ECF/ AFCD regarding amphioxus, benthic organisms in Mai Po, etc. However, these studies seem to be conducted on an ad-hoc basis with outcomes not readily available; long-term and territorial wide studies on important groups/ habitats (e.g., mudflats) are needed. These can be done in-house by the AFCD or by qualified contractors (e.g., academic institutes). A more balanced approach to developing and conducting a research agenda by AFCD is needed, including studies on a range of marine species and a clearer policy on data access once government reports have been finalized, and broader sharing of data on marine species within the Hong Kong community as a whole (see Data Access and Sharing Report). There are big gaps related to monitoring changes to populations over time, but also in understanding the distribution of different species in HK waters.

The formation of the Sustainable Fisheries Development Fund is an excellent opportunity to plan to fill data gaps. Decisions are needed to determine a meaningful research agenda. Although the focus of this fund is on sustainable fisheries, without sustainably managed marine resources sustainable fisheries are not possible so more focus is needed on attaining healthy marine fish and invertebrate populations and removing or minimizing threatening factors. The contracting of a fisheries science expert, currently lacking in Hong Kong, should be considered to bring in fishery science expertise and design fishery assessment protocols and other data collection, as identified herein. Considerably more work (research and monitoring) is needed for marine species.

Monitoring of the effectiveness or outcomes of measures introduced/mandated/agreed to mitigate impacts to marine species as a result of development projects need to be evaluated for effectiveness. This would allow for ongoing improvement of mitigation measures and avoid potential waste of money that can occur when unproven or ineffective mitigation measures are applied.

We can also do more to build on approaches like ReefCheck by developing science-based platforms where members of the public with a basic level of training can submit records of species noted. This is now an integral part of Hong Kong Coastal Watch, and can help with spatial distributions and changes over time. Engaging the diving and other communities should be considered.

D.6. Education

It is important to increase public and government awareness and appreciation of the value and biodiversity of Hong Kong's marine environment which contributes significantly to the rich biodiversity of the city. This should lead to better support and understanding of the need for management initiatives, appreciation for our marine biodiversity, and highlight the longer term benefits of increased management and conservation activities.

D.7. Conclusion

We have truly amazing marine life in Hong Kong and a rich marine heritage in the city. However these remain poorly known, or viewed by many simply as food. We need to move beyond this to a better recognition of the need to conserve marine life.

END