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Surveys

Why South-East Asia should be the World's Priority for Averting Imminent Species Extinctions, and a Call to Join a Developing Cross-Institutional Programme to Tackle this Urgent Issue

J. W. Duckworth[1], G. Batters[2], J. L. Belant[3], E. L. Bennett[4], J. Brunner[5], J. Burton[6],
D. W. S. Challender[7], V. Cowling[8], N. Duplaix[9], J. D. Harris[10], S. Hedges[4], B. Long[11],
S. P. Mahood[12], P. J. K. McGowan[13], W. J. McShea[14], W. L. R. Oliver[15], S. Perkin[16],
B. M. Rawson[17], C. R. Shepherd[18], S. N. Stuart[10], B. K. Talukdar[19], P. P. van Dijk[20],
J-C. Vié[21], J. L. Walston[22], T. Whitten[23] and R. Wirth[24]

1. IUCN SSC, 6 Stratton Rd, Saltford, Bristol BS31 3BS, U.K.

2. Cattle and Camelid Taxon Advisory Group, European Association of Zoos and Aquaria, Banham Zoo, The Grove, Banham, Norfolk, NR16 2HE, U.K.

3. Center for Resolving Human–Wildlife Conflicts, Mississippi State University, Box 9690 Mississippi State, MS 39762, U.S.A.

4. Species Conservation, Wildlife Conservation Society, 2300 Southern Blvd, Bronx, New York 10460, U.S.A.

5. IUCN, 2A Van Phuc Diplomatic Compound, 298 Kim Ma, Hanoi, Vietnam

6. Earthwatch Institute, 256 Banbury Rd, Oxford, OX2 7DE, U.K.

7. Durrell Institute of Conservation and Ecology, School of Anthropology & Conservation, University of Kent, Canterbury, Kent CT2 7NR, U.K.

8. WWF Laos, P.O. Box 7871, Saylom, Chanthabouli, Vientiane, Lao PDR

9. IUCN SSC Otter Specialist Group, Fisheries and Wildlife Department, Oregon State University, 104 Nash Hall, Corvallis, OR 97331-3803, U.S.A.

10. IUCN SSC, 7-9 North Parade Buildings, Bath BA1 1NS, U.K

11. World Wildlife Fund, 1250 24th St NW, Washington, DC 20037, U.S.A.

12. Wildlife Conservation Society Cambodia Program, PO Box 1620, Phnom Penh, Cambodia

13. World Pheasant Association, Newcastle University Biology Field Station, Close House Estate, Heddon on the Wall, Newcastle upon Tyne, NE15 0HT, U.K.

14. Smithsonian Conservation Biology Institute Conservation Ecology Center National Zoological Park 1500 Remount Rd, Front Royal, VA 22630, U.S.A.

15. Philippines Biodiversity Conservation Programme, Philippines Biodiversity Conservation Foundation, 3A Star Pavilion Apartments, 519 Alonzo St, Malate, Manila, Philippines 1004

16. IUCN Asia Regional Office, 63 Sukhumvit Soi 39, Wattana, Bangkok 10110, Thailand

17 . Conservation International, #102, Street 95, Phnom Penh, Cambodia

18 . TRAFFIC Southeast Asia, Unit 3-2, 1st floor, Jalan SS23/11, Taman SEA, 47400 Petaling Jaya, Selangor, Malaysia

19 . Aaranyak and International Rhino Foundation, 50 Samanwoy Path (Survey), PO: Beltola, Guwahati - 781 028, Assam, India

20 . Tortoise and Freshwater Turtle Conservation Program, President's Office, Conservation International, 2011 Crystal Drive - Suite 500, Arlington, VA 22202, U.S.A.

21 . Global Species Programme, IUCN, 28 rue Mauverney, CH-1196 Gland, Switzerland

22 . Asia Program, Wildlife Conservation Society, 2300 Southern Blvd, Bronx, New York 10460, U.S.A.

23 . Fauna & Flora International, Jupiter House, Station Rd, Cambridge, CB1 2JD, U.K.

24 . Zoologische Gesellschaft für Arten- und Populationsschutz, Untertaxetweg 144, 82131 Gauting, Germany

Correspondence to: will.duckworth@iucn.org

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Abstract

Global species loss during the present human-caused mass-extinction far exceeds background rates and is detrimental to human existence. Across the globe, vertebrate extinction risks are highest in South-east Asia. This region has among the world's fastest recent habitat-loss rates. More of a determinant to the conservation status of many vertebrates has been a huge explosion in South-east and East Asian trade demand, and thus harvest rates, for wild species for luxury food, medicine, tonics, horns and other trophy parts, and captive animals. The region has little tradition of effectively managed protected areas. Consequently, many South-east Asian species will become extinct in the near future if current trends continue. An emerging programme co-ordinated by IUCN SSC on behalf of its member organisations is being developed to assist implementing agencies and their partners minimise the impending extinctions among South-east Asian non-marine vertebrates. The programme is neither a direct implementing body nor a direct donor, but is a supporter using the synergistic strength of its constituent organisations and IUCN's intergovernmental status to ameliorate perennial challenges to these species' conservation. Its two main components are (1) to identify species at greatest risk of extinction, specify their conservation needs and support conservation efforts to reduce this risk; and (2) to build, in selected ways, an enabling environment for species-specific interventions. To address the first component, the programme will: develop and maintain a priority species list with associated priority sites necessary to reduce extinction; determine what conservation mechanisms are already in place (many species presently have none), and encourage additional actions as warranted; and serve as a clearinghouse for information and skills exchange. To address the second component, the programme will: work with existing and new donors to prioritise these species and develop emergency and long-term conservation funding mechanisms for them; encourage the integration of priority species into relevant conservation plans; serve as a liaison body to support dialogue among relevant parties in improving species' conservation (e.g. governmental and non-governmental site- and higher-level implementing agencies, and donors); support the functionality of information/expertise-based bodies such as IUCN SSC specialist groups; serve as a mechanism to link recommended conservation strategies with appropriate 'stakeholders'; and increase public awareness of the severity of this extinction crisis. By October 2012, working species and site lists will be available and a stakeholder meeting will have discussed the working mechanics of the programme. Any highly collaborative effort of this magnitude faces stiff challenges. It must serve only as a catalyst, recognising and supporting existing efforts, and encouraging action for species presently not receiving it. All parties must recognise that not all conservation efforts will be successful: extinction potential of high-risk species is, by definition, not negligible. Many of the most-threatened South-east Asian species have high market value, or are bycatch of those which do, meaning that powerful vested interests oppose their conservation. Considerably increased funding, primarily to implementing agencies, for highly-threatened species in South-east Asia is required. Funding to run the programme must not compete with the implementing agencies' existing sources. Human capacity is also limiting outcomes, and how to effect an appropriate increase in capable and committed personnel to use increased funding effectively remains unclear. Finally, the philosophy of the programme must be recognised by all as only part of overall species conservation in South-East Asia.

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1. INTRODUCTION

The world's biodiversity is in crisis (e.g. Terborgh, 1999; Ceballos *et al.*, 2010; Cardinale *et al.*, 2012). Of biodiversity's various levels, species hold a special place in the imagination of conservationists and the public alike: people equate to them more readily than to elements such as genes and ecosystems. *The IUCN Red List of Threatened Species*[1] categorises species' extinction risk (Vié *et al.*, 2009). Recent comprehensive *Red List* assessments show high threat levels for amphibians (30% of 6,347 species considered globally threatened), birds (12% of 9,990), mammals (21% of 5,488), cycads (52% of 289), conifers (28% of 620) and freshwater crabs (17% of 1,281 species; but a further 49% of them were listed as Data Deficient) (Cumberlidge *et al.*, 2009; Hilton-Taylor *et al.*, 2009). Recent losses far exceed typical 'background' extinction rates, those before people dominated the earth (e.g. Baillie *et al.*, 2004; McCullum, 2007; Ceballos *et al.*, 2010). Moreover, the Red List Index shows that extinction risks are increasing (Hilton-Taylor *et al.*, 2009). The various factors driving species to extinction result directly and indirectly from the hugely increased human population and its increased disposable income (e.g. Vitousek *et al.*, 1997; Steffen & Tyson, 2001; TRAFFIC, 2008; Cardinale *et al.*, 2012).

Species loss is problematic for humanity at multiple levels, although precise effects of any given level of loss remain uncertain (Ehrlich & Ehrlich, 1981; Balmford & Bond, 2005; Millennium Ecosystem Assessment, 2005; Cardinale *et al.*, 2012). Unsurprisingly, species directly harvested for use are more likely to be assessed as globally threatened by the *Red List* than those that are not (Hilton-Taylor *et al.*, 2009). Many species, whether harvested or not, are vital for effective ecosystem function and, thus, ultimately for human survival. Averting species loss, once seen as a niche luxury (e.g. Prendergast & Adams, 2003), is thus now stated policy of a growing majority of the world's governments. Most countries (192 so far) are Parties to the Convention on Biological Diversity (CBD), which came into force in December 1993. The CBD's 2011–2020 strategic plan includes the 20 'Aichi targets'. Target 12 contains the most explicit, concise mainstream recognition yet of the primacy of species conservation: "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" (CBD, 2011, p.16).

This contribution profiles one part of the world with a high concentration of threatened species, and describes a response under preparation. It aims to encourage further discussion about how to respond and to encourage involvement in such responses.

2. WILDLIFE AND CONSERVATION IN SOUTH-EAST ASIA

Extinction risk is uneven across the earth's surface. Confining discussion to non-marine species, most taxonomic groups so far studied are more threatened in South-east Asia (here, the countries of ASEAN, the Association of South-East Asian Nations [Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, the Philippines, Singapore, Thailand and Vietnam] plus Timor-Leste) than elsewhere (e.g. Brook *et al.*, 2003; Cardillo *et al.*, 2006; Sodhi & Brook, 2006; Lee & Jetz, 2008; Schipper *et al.*, 2008; Hilton-Taylor *et al.*, 2009; Sodhi *et al.*, 2010). Notably, compared with Meso-America, South America or sub-Saharan Africa (South Asia was not included in the comparison), South-east Asia has a higher proportion of its vascular plant, reptile, bird and mammal species categorised as globally threatened on the *Red List* (Sodhi *et al.*, 2010). These high threat levels are of particular concern, because South-east Asia is an important region for wildlife. Nearly all of it falls within biodiversity 'hotspots' (Myers *et al.*, 2000), and of the above-mentioned tropical regions it has the highest mean proportion of country-endemic bird (9%) and mammal species (11%), and nearly does so for plants (Sodhi *et al.*, 2010).

A fundamental reason for the region's elevated threat level is that 47.9% of the world's people live in South-east Asia or the adjacent countries of China, Bangladesh and India, yet this region comprises only 11.8% of the earth's land area.

South-east Asia itself supports 8.9% of people in 3.0% of the earth's land[2]. Notwithstanding the high fertility of areas such as parts of Java and Bali (Whitten *et al.*, 1996) and the region's lack of deserts or permanent ice, large conservation landscapes are, therefore, likely to be less feasible in South-east Asia than where human densities are much lower. Accordingly, mapping human activity to define 'the last of the wild' found very little of South-east Asia that could be so described (Sanderson *et al.*, 2002). However, nearby India's 'human footprint' is generally even more intense (Sanderson *et al.*, 2002) yet it is notably more successful in retaining species highly attractive to hunters and with large area needs, such as Tiger *Panthera tigris*, Asian Elephant *Elephas maximus* and Greater One-horned Rhinoceros *Rhinoceros unicornis* (Talukdar, 2006; Karanth *et al.*, 2010; Walston *et al.*, 2010). This indicates that the conservation challenge of South-east Asia cannot arise solely through the difficulties of reconciling the space needs of many people with landscape-level conservation.

South-east Asia has a higher annual rate of deforestation than Meso-America, South America or sub-Saharan Africa, and it increased between 1990–2000 and 2000–2005 (Sodhi *et al.*, 2010). Forest loss through conversion, fragmentation and degradation is high, particularly in the lowlands (e.g. Jepson *et al.*, 2001), although loss is generally somewhat lower in and near declared protected areas (e.g. Curran *et al.*, 2004; Gaveau *et al.*, 2009). The past few decades saw massive conversion of Sundaic forest to plantation agriculture, notably oil palm *Elaeis guineensis* and rubber *Hevea brasiliensis* (e.g. Mohd-Azlan & Lawes, 2011; Miettinen *et al.*, 2012). Such conversion is now intensifying in northern South-east Asia, with eucalyptus *Eucalyptus*, sugar-cane *Saccharum officinarum*, biofuels and varieties of rubber and even oil palm able to cope with a marked dry season (e.g. Ziegler *et al.*, 2009). Of all large South-east Asian countries, the Philippines has lost by far the highest proportion of forest. Over 93% of the country's original forest cover has been converted, reflecting its position as the region's most densely populated large country. Most of this loss has been driven by commercial logging operations instigated during U.S. and post-colonial administrations (e.g. Ong *et al.*, 2002). This circumstance is exacerbated by the Philippines Archipelago being divided into at least six 'major' (and many more 'minor') faunal regions. Each constitutes a distinct and separate centre/sub-centre of endemism, wherein the country's most severely threatened taxa are concentrated. As a result, the Philippines supports more severely threatened endemic species than does any other country in the world (Oliver & Heaney, 1997; Oliver, 2006).

Despite these habitat encroachment rates, overharvest is the main threat to many vertebrates, especially outside the Philippines. The marked and widespread 'empty forest' syndrome (Redford, 1992: forests largely devoid of noticeable wildlife), stems from overhunting (e.g. Robinson & Bennett, 2000; Nooren & Claridge, 2001; Corlett, 2007). The following discussion focuses on extinction risks in the next 10-30 years,

although if current habitat trends continue, within 50+ years many more South-east Asian species, hunted and non-hunted alike, may go extinct (e.g. Laurance, 2006).

Heavy hunting in South-east Asia, particularly its northern part, reflects the apparently limitless trade demand for wildlife in the region and in East Asia (China, Korea, Japan, Mongolia and the Russian Far East). Many species are in demand, particularly for consumption, as 'strengthening' food, tonics and medicines (e.g. Yang *et al.*, 2000; Nooren & Claridge, 2001; Bell *et al.*, 2004; Lee *et al.*, 2005; World Bank, 2005; Nguyen, 2008; Zhang *et al.*, 2008; Pantel & Chin, 2009; Nijman, 2010; Caillabet, 2011; Felbab-Brown, 2011; Nijman *et al.*, 2012). Increasingly, these perceived attributes seem subsidiary to the status-symbolism of wild mammal and reptile meat's rarity and thus expense (Drury, 2009; see also Rivalan *et al.*, 2007). This is the reverse of the situation in many other tropical areas, where wild meat is an important protein source for the urban poor who cannot afford farmed meat (e.g. van Vliet *et al.*, 2012), as are wild fish in South-east Asia. The long-distance luxury consumption trade comprises mostly large (over 1 kg) mammals, turtles and tortoises (Testudines), crocodiles (Crocodilia), suitably large snakes, monitors *Varanus*, Tockay *Gekko gecko* and salamanders (Caudatra). A much wider taxonomic variety is consumed largely locally. These are generally not so threatened by offtake, in part because the high-demand species have moved from local consumption to long-distance trade as urban markets have developed (e.g. Newton *et al.*, 2008; Challender, 2011).

Trade in South-east Asia's species for live captives and body parts not for eating has had similar severe impacts. Body parts, such as horns and other trophies, and reptile, pangolin and otter skins, are usually sought for display and to enhance the owner's social standing (e.g. Srikosamatara & Suteethorn 1995). Hundreds of species, especially of birds, reptiles and fish, are taken in bulk (e.g. Ng & Tan, 1997; Shepherd, 2006, 2010a, 2010b; Lau et al., 2010; Challender, 2011; Luiselli et al., in press). The live animal demand has driven many species almost (such as Bali Starling *Leucopsar rothschildi*) or perhaps already (such as Siamese Bala-shark *Balantiocheilos ambusticauda*) to extinction (e.g. Nash, 1993; van Balen, 1999; BirdLife International, 2001; Shepherd & Ibarrondo, 2005; Shepherd, 2006; Ng & Kottelat, 2007). Restricted-range species, especially new discoveries, are in high demand in these markets, which are stimulated by rarity and novelty (e.g. Stuart et al., 2006). Thus, Roti Island Snake-necked Turtle *Chelodina mccordi*, described only in 1994, was declared commercially extinct in 2000 (Samedi & Iskandar, 2000; Shepherd & Ibarrondo, 2005). In the Philippines, no trade demands existed for Camiguin Colasissi *Loriculus camiguinensis* before it was named (Tello et al., 2006), or Philippine Forest Turtle *Seibenrockellia leytensis* before its rediscovery (Diesmos et al., 2004), but the publicity around these events invoked local and international trade demands for live animals leading to seri-

ous (potentially catastrophic) declines in the populations of these species (WLRO, personal observation).

Local live markets are huge in some South-east Asian countries, but export is also massive: over 500,000 shipments of wildlife, containing over 1,480,000,000 live animals, were imported by the USA during 2000–2006 (Smith *et al.*, 2009). Mostly (92%) these were for commercial purposes, largely the pet trade: over 69% of these live animal imports originated in Southeast Asia (Smith *et al.*, 2009). Laundering of wild-caught South-east Asian animals, particularly reptiles, as captive-bred, to circumvent trade regulations, occurs and may be a very significant threat (Nijman & Shepherd, 2009; Lyons & Natusch, 2011; Luiselli *et al.*, in press).

The various wildlife trade demands are penetrating South-east Asia at different rates. In part this presumably reflects great diversity within South-east Asia in governance, civil obedience, religious and socio-economic factors, and thus basic predisposition for poaching and consuming wildlife (see Milledge, 2007). In some areas low market-value wildlife still remains little affected. In general, those parts of South-east Asia initially less permeated by traders are increasingly targeted as animals are extirpated in early supply areas (e.g. van Dijk *et al.*, 2000; Challender, 2011). Additionally, as high-value species become scarce, formerly lower-value species, or classes within species (e.g. smaller individuals) are increasingly demanded (e.g. Tungittiplakorn & Dearden, 2002; Allan *et al.*, 2005).

Freshwater fish are a special case in that large legal offtakes occur, many of which are assumed to be sustainable, although firm evidence of this is rare. Declines in catch per unit effort are widespread, but the fisheries but the fisheries rather than faunistics focus" to "but the fisheries (rather than faunistics) focus of much inland fish survey work hinders the identification of species in steep decline. And where these are identified, it is often unclear whether they are being pushed to extinction, or 'just' economic collapse, and whether the cause is overharvest rather than factors such as pollution or changing hydrodynamics (e.g. Allan *et al.*, 2005). For many fish, such threats are augmented by the proliferation of hydroelectric power dams across the region's rivers. These prevent essential migrations undertaken by many South-east Asian river fish. Equally they may change all habitat in the entire range of sedentary micro-endemics: species such as *Schistura leukensis* and *S. tenura*, discovered during pre-project surveys for hydropower dams, have not been seen since impoundment (Kottelat, 2000; Halls & Kshatriya, 2009; Dugan *et al.*, 2010; ICEM, 2010; Ferguson *et al.*, 2011; Ziv *et al.*, 2012; CEPF, in prep.). South-east Asia, notably the Mekong, has an outstanding concentration of giant freshwater fish and these are particularly threatened (Mattson *et al.*, 2002; Stone, 2007; Thompson, undated). The result is that "fresh waters are experiencing declines in biodiversity far greater than those in the most affect terrestrial ecosystems" and "protection of freshwater biodiversity is perhaps the

ultimate conservation challenge" (Dudgeon *et al.*, 2006, p.163). Across the globe, the challenge is believed to be greatest in tropical Asia (Dudgeon, 2000).

Wildlife trade is problematic in much of the world (e.g. Bennett et al., 2002; Fa et al., 2002; Oldfield, 2003; Sutherland et al., 2009; Bennett, 2011), but several factors make it especially so in today's South-east Asia. These mostly reflect breakneck economic growth there and in adjacent East Asia (TRAFFIC, 2008; Drury, 2009; McNeely et al., 2009; Nijman, 2010) and the commensurate expansion and improvements to transport infrastructure that increases both access to wildlife areas and the capacity for transporting wildlife, while reducing overall costs. These factors have fuelled a massive demand for wildlife and their products, which has then driven both the use of new, highly capture-efficient, harvesting technologies (e.g. small-mesh nylon gill-nets for fish; Poulsen et al., 2004) and made existing but expensive technologies cost-effective (e.g. guns and cable snaring; e.g. Bennett et al., 2000; Hansel, 2004; SWG, 2009).

This economic growth has not been matched by strengthening the enforcement of hunting and wildlife trading laws. Political and citizen appreciation of the consequences of mass extinctions is uneven. Many still see trade-driven hunting as a scaled-up local misdemeanour, not as the high-tech, large-scale, high-investment–high-return, crime that it is. Available resources are thus insufficient to tackle the challenge (McNeely et al., 2009; Bennett, 2011; South & Wyatt, 2011). In many areas personal conscience is the main deterrent to illegal offtake. The region's limited tradition of effectively managed protected areas means that many hunting-sensitive species have no actively secured populations. By contrast, neighbouring South Asia, not much more distant from big markets, has more generally functional protected areas (Yonzon, 2006). There are effectively protected areas in South-east Asia (at least, for their target species; see below), but harvest-sensitive species persist mostly only because sufficiently large and remote areas remain for enough animals to escape hunting (e.g. Timmins & Duckworth, 1999; Rawson et al., 2011). Such passive persistence cannot be relied upon much longer, given regional trends in habitat fragmentation and notably road expansion (see above). Even high-profile areas with longstanding large budgets may effectively protect only small parts (e.g. Lynam et al., 2006; Dudley & Stolton, 2011). And the more valuable a species is, the harder people will work to find it. Nowhere in mainland South-east Asia seems to have proven remote enough to retain a viable rhinoceros population (Brook et al., 2012; Zafir et al., 2011). Many taxonomic groups particularly susceptible to overharvest, and with three or more species occurring solely or predominantly in South-east Asia, have 80–100% of these species considered globally threatened by the *Red List*, e.g. crocodiles, tortoises (Testudinidae), softshell turtles (Trionychidae), storks (Ciconiidae) and ibises (Threskiornithidae), resident vultures *Gyps* and *Sarcogyps*, wild hogs (Suidae), wild cattle

(Bovini), typical (i.e. non-muntjac *Muntiacus*) deer (Cervinae), odd-nosed colobines (*Rhinopithecus, Pygathrix, Nasalis* and *Simias*) and apes (Hylobatidae and *Pongo*). More comprehensive Red List assessment of reptiles and fish would reveal yet more such groups.

Trade threats to wild populations are exacerbated by the region's ongoing habitat conversion (notably heavy forest conversion to plantations), degradation and fragmentation. This compromises populations' resilience to offtake: it is easier to extirpate a population the smaller is its habitat-block, particularly when blocks are isolated (e.g. Peres, 2001; Reed, 2004; Linkie et al., 2006; Ferraz et al., 2007; Gray et al., 2010). Wetlands, grasslands and other flatland habitats have been particularly affected because they are preferentially cleared for agriculture, particularly rice. Even those that remain are not safe: over 45% of South-east Asia's 'protected' wetlands are considered threatened (Hilton-Taylor *et al.*, 2009). Thus, many wetland (including wet grassland) species too small or dispersed to be targets of harvesting have declined markedly, such as Rufous-rumped Grass Babbler *Graminicola bengalensis*, a bird unrecorded in South-east Asia since 1923 (Leader et al., 2010). Fortunately it survives elsewhere (Leader et al., 2010), but Schomburgk's Deer *Rucervus schomburgki*, only ever known from Thailand's seasonally inundated central plains, was hunted while the plains were rapidly converted for rice, and the last known individual was killed in 1938 (Lekagul & McNeely, 1977). The loss of the wetlands is of particular concern: despite covering less than 1% of the world's surface, they hold about 6–7% of the world's species (Balian *et al.*, 2008), with wet grasslands holding highly distinctive animals such as Bengal Florican *Houbaropsis bengalensis*. Hunting is also not responsible for the threatened status of many species, particularly small-bodied ones, in South-east Asia's two large archipelagos, the Philippines and Indonesia–East Malaysia–Brunei Darussalam–Timor Leste. These hold many restricted-range endemic species heavily threatened by habitat change, introduced species and other factors (e.g. Brooks *et al.*, 1997; Oliver & Heaney, 1997; BirdLife International, 2001; Amori *et al.*, 2008; Clausnitzer *et al.*, 2009).

The situation of increased trade-driven hunting in decreasing but more accessible habitat occurs in many parts of the world: South-east Asia is distinct only in degree. Moreover, some particularly hunting-sensitive wildlife is already sourced outside South-east Asia to meet market needs, in, e.g. turtles, pangolins *Manis*, big cats *Panthera*, rhinoceroses (Rhinocerotidae) and elephants *Elephas* and *Loxodonta* (Blake & Hedges, 2004; Sze & Dudgeon, 2006; Bennett, 2011; Bouché *et al.*, 2011; Challender, 2011; TRAFFIC, 2011).

Most of the highly damaging wildlife trade involving South-east and East Asia contravenes national laws and international treaties, notably CITES (the Convention on International Trade in Endangered Species of Wild Fauna and Flora, to which all South-east Asian countries except Timor-Leste are

Parties). Unlike subsistence hunting by the rural poor, this trade has no morally appealing basis. Indeed, in hilly northern Lao PDR, trade has so depleted wildlife that nutritional status of the rural poor themselves is worsening (Krahn & Johnson, 2007). There are too few studies elsewhere to assess how widespread is this phenomenon. Wildlife trade follows routes resembling those for illegal trade in drugs, armaments and people, and some of the same people and organisations are involved (Warchol, 2004; World Bank, 2005; TRAFFIC, 2008; Elliott, 2009; Haken, 2011; South & Wyatt, 2011). Reducing consumer demand for wildlife, and the evolution of effective enforcement systems supported by local society and communities, may take decades: societal change in beliefs and subsequent behaviour change is needed (Bennett, 2011). Nevertheless, such change is the only long-term solution without the enormous, indefinite, resource requirements necessary for enforced protection of those wild populations eagerly sought by lawbreakers.

Many South-east Asian species will become extinct during the next human generation, on current trends (Bennett, 2011). In the interim, even with the highest levels of trade enforcement, the best prevention is time-buying activities focussed on key populations, both *in situ* and *ex situ* (which are, increasingly, ends of a continuum; Pritchard *et al.*, 2011). Without *ex situ* management, Père David's Deer *Elaphurus davidianus* of China, the Vietnamese race of Sika *Cervus nippon pseudaxis*, Bali Starling and several other species of South-east Asia and surrounds would probably be extinct (Ratajszczak *et al.*, 1993; Jiang *et al.*, 2000; BirdLife International, 2001; Mattioli, 2011). But *in situ* conservation of highly threatened species can at the same time prevent mass extinctions, preserve habitat function and integrity, and maintain evolutionary potential and ecosystem services (Drummond *et al.*, 2010). The appropriate balance between these approaches differs between species, depending on their population status and threats. Unfortunately, the region's protected area systems are mostly recently created and far from effectively managed (e.g. Smith *et al.*, 1999; Rao *et al.*, 2002; ICEM, 2003a–b; Tordoff *et al.*, 2004; Myint Aung, 2007; Gumal *et al.* 2008, Or & Tang, 2011; Mohd-Azlan & Lawes, 2011; Harrison, 2011). Despite the need for systems-level improvement, there are some notable successes of site-based conservation in South-east Asia. Some are long-term, such as the Javan Rhinoceroses *Rhinoceros sondaicus* of Ujung Kulon National Park, Java, which have remained at a few dozen animals for decades (Griffiths, 1993; Griffiths *et al.*, 2012). Although the population needs to rise to secure the species's future, this animal fetches such high prices in the trade that the prevention of its extinction, in such a densely populated island, demonstrates that with sufficient will almost any species must be conservable. Also excellent indicators of what is possible are the recent events in several formerly heavily hunted areas, such as resurgent ungulate populations in a previously heavily poached part of Thung Yai Naresuan Wildlife Sanctuary, Thailand (Steinmetz *et al.*, 2009) and large, sustained, increases in various

diverse hunted species in Seima Protection Forest, Cambodia (O'Kelly & Nut 2010). Such successes show that appropriate types and intensities of law enforcement and liaison with local people can conserve species of even high trade value on site, even those not conventionally of high public appeal (e.g. van der Ploeg *et al.*, 2011). Despite this, some of the region's conservation practitioners are pessimistic about site-based conservation. Indeed, many site-based conservation projects do not deliver the intended benefits, although this is rarely written up (e.g. Redford & Taber, 2000; Webber *et al.*, 2007). In some cases, project methodologies were flawed (e.g. unrealistic expectations from so-called integrated development and conservation projects; e.g. Wells *et al.*, 1998; Linkie *et al.*, 2008), in others, sound plans were poorly executed; and for hardly any is there any credible outcomes monitoring (Ferraro & Pattanayak, 2006; Gratwicke *et al.*, 2007). The challenge is to make more site-based species-focussed projects work effectively.

3. A RESPONSE UNDER DEVELOPMENT

Each species extinction is a loss to everyone across the world, even to those not directly aware of it. Thus, global resources should be mobilised to minimise the number of extinctions, particularly because the opportunity costs of *in situ* conservation often fall largely on already marginalised local people (Adams *et al.*, 2004; Scherl *et al.*, 2004; Coad *et al.*, 2008). Raising and deploying effectively the financial and technical (including human capacity) resources to restrain projected extinction rates of South-east Asian species is arguably the conservation community's biggest challenge in meeting Aichi 2020 Target 12. Among the broad scope of conservation-oriented resources deployed in South-east Asia, targeted funding for highly threatened species is supported by various donors including the IUCN-Global Environment Facility-World Bank funding programme SOS (Save Our Species) and the Critical Ecosystems Partnership Fund (CEPF). Both these funding sources are relatively recent, responding to the region's situation. They are not, so far, sufficient to meet all the urgent funding needs, and do not (and were not intended to) address the gaps in other resources. An emerging programme, here called by its interim name of Action Asia (AA), has the goal of minimising global extinctions among South-east Asia's non-marine vertebrates. The restriction to non-marine species reflects the reality that marine conservation often involves different people, institutions and techniques from those of land and freshwater undertakings. There are many severely threatened marine species in South-east Asian waters (e.g. Polidoro *et al.*, 2008; Field *et al.*, 2009; Chong *et al.*, 2010), but for AA to try to cover them increases the risks of its early failure through overambitious objectives. For similar reasons, the invertebrates, fungi and plants of land and freshwater habitats have to be excluded, at least initially.

AA will be a coalition of organisations involved in wildlife conservation in the region (most of which are IUCN

members) coordinated by the IUCN Species Survival Commission (IUCN SSC); IUCN is pre-adapted to this role, being inter-governmental and holding observer status at the UN General Assembly. Through information collation and prioritisation it will maintain a watching brief on the global status of Critically Endangered non-marine vertebrates of South-east Asia (excluding erratic vagrant visitors), stimulating action for those species receiving insufficient conservation attention and offering assistance to existing systems. AA will not implement activities directly: its role is to support implementing agencies, including partnerships (often between governments and NGOs [non-governmental organisations]). It will identify species and sites warranting support, and work with implementing agencies, where there are any, already involved with those species and sites to evaluate current conservation actions and identify required additions. It will source technical support where requested, identify collaborations that already exist and, if needed, work to improve their effectiveness. It will facilitate collaborations between organisations where none yet exist. Where there are already adequate conservation interventions, monitoring and collaborations, it will work with relevant institutions to identify other ways in which it can support them, if any. Conversely, where no implementing agencies are supporting a species or a site it will identify potential support bodies and, if requested, work with them to design effective conservation interventions.

These species' diverse conservation needs mean that a formulaic treatment for each species would constrain more than enable: as a catalytic coalition AA will use the synergistic power of its partners to evaluate on a case-by-case basis what is needed, and attempt to ensure that it happens. For species threatened by trade, a 'fort-holding' focus on effective management of species strongholds (whether or not formal protected areas) will be the cornerstone. Almost invariably, species of high trade value need protection through intensive law enforcement, as is so for any class of valuable objects at risk of illegal appropriation. Law enforcement is only one of a set of tools, but in much of South-east Asia it has often been the one with the biggest shortfall in implementation over the past 20 years. This has often rendered the other tools used inefficient, sometimes futile (Linkie *et al.*, 2003; Stokes, 2010).

AA's focus on assisting implementing agencies in alleviating direct threats to specific populations is complementary to the ongoing vital thematic undertakings above the site level. These include the reduction of wildlife trade through work at transit and consumer levels (e.g. TRAFFIC[3] and the ASEAN Wildlife Enforcement Network[4]), research to learn more about species' conservation status, and education programmes for the general public at all levels about biodiversity's values.

AA's two main components are: (1) to identify the species in urgent need, agree their conservation needs (mostly relating to habitat and harvesting, the balance differing greatly between species), and support the latter's implementation; and (2) to build, in selected ways, an enabling environment for these

species-specific interventions. This second component, perhaps seeming at variance with a focussed approach, is not an attempt to build an overarching conservation strategy for South-east Asia. It is a recognition that specific interventions needed by each species require sufficient finance, technical capacity and political support, and that where AA can bring something additional to the existing system, it should do so. The contents of each component have been determined by extensive discussion, of the current conservation status and environment in South-east Asia, with many people within and outside IUCN SSC. As well as the authorship and those named in the acknowledgements, these include participants at workshops in Abu Dhabi (in February 2012, for AA, during the IUCN SSC Specialist Group Chairs' meeting) and in Hanoi (in May 2012, specific to Vietnam). Many people have spoken in more than one role, e.g. for the institution employing them and for an IUCN SSC specialist group or *Red List* authority.

3.1 SPECIES WITH URGENT CONSERVATION NEEDS

1. Maintain a list ('eligible species list') of highly threatened non-marine vertebrate species which occur (other than as vagrants or aliens) in South-east Asia, based on species Critically Endangered on the *Red List*; presently about 150 species meet these criteria. Support the relevant Red List Authorities to assess the (as-yet unknown number of) species likely to warrant such listing but presently in other categories, including Not Evaluated and Not Recognised.

2. Within the eligible species list, identify species of immediate priority ('priority species list'): those at the most imminent risk of extinction. Many of these are not yet established priorities, or even well-known, in much of the wider conservation community. This is among the biggest hurdles to their conservation (e.g. SWG, 2009).

3. Generate a list of 'vital sites', those irreplaceable or nearly so for one or more eligible species (Box 1). This list will be very different from most other site-priority lists, such as Important Bird Areas (BirdLife International, 2004), Endemic Bird Areas (Stattersfield *et al.*, 1998), Key Biodiversity Areas (e.g. CEPF, in prep.), important habitats (e.g. wetlands; Ramsar sites[5]) which all produce site lists far lengthier than will AA. Such lists are complementary to AA, informing activities such as designing balanced national protected area systems. The closest existing site list may be that of the Alliance for Zero Extinction[6] (sites holding species with no viable population elsewhere); but a fair number of highly threatened species are suspected to have potentially viable populations at more than one site (or, at least, no one site of the several which may possibly do so can be said to be more likely to do so than the others) and, conversely, many single-site species are not on the brink of extinction.

4. Determine for each priority species whether: (1) it has a support system in place, which may or may not need additional inputs (financial, technical, political, public interest), or (2) it has no current such system and so is in danger of extinction by neglect. Despite the proliferation of action plans over the last 20 years, regional conservation still largely relies upon implementing agencies selecting themselves to take on any given species. There is no centralised mechanism to rectify gaps or even, necessarily, notice them, thus enhancing risk of extinction by oversight.

5. Encourage action for priority species presently with no support, or at risk of losing it through, for example, impending personnel changes or funding uncertainties (see Rawson *et al.*, 2011, p. 36; most of the many such cases are never documented). This includes lobbying donors to prioritise such species.

6. Support the relevant taxon-focussed overseers (such as IUCN SSC specialist groups; see IUCN SSC, 2012) to provide a discussion platform about each priority species' short- and long-term conservation needs and exchange species-specific information with on-the-ground implementing agencies. Few species so far have active such systems, the Saola Working Group of the IUCN SSC Asian Wild Cattle Specialist Group being one (e.g. SWG, 2009). Directly consult with taxon-focussed overseers about what additional support, if any, they would welcome; and, where practicable, assist in sourcing such support.

7. Develop a system of tracking of each priority species' conservation status, ensuring that this does not become an end in itself demanding so many resources as to stint interventions. Produce an annual overview of the eligible species' conservation status, (i) determining which have priority actions underway or in preparation (and the extent to which these are expected to meet each species' needs), which are being incidentally conserved under general interventions (with similar assessment of appropriateness to needs) and which are not being addressed at all; and (ii) giving implementing agencies a place to highlight areas they would welcome assistance and to communicate their progress.

Box 1. Selecting vital sites, exemplifying the problem of incomplete information.

Walston *et al.* (2010) argued persuasively for the need to prioritise resources for Tiger *Panthera tigris* conservation to 'source sites', those most likely to drive population recovery. Their analysis revealed that over two-thirds of surviving Tigers were in just 6% of present (and < 0.5% of historical) Tiger range. Few tropical Asian species have such

population detail. Most AA-priority species do not allow the luxury of choice between many possible implementation sites. Some, such as Javan Rhinoceros, occur only at one locality (Griffiths *et al.*, 2012); at the other extreme, the giant softshell turtle *Rafetus swinhoei* is down to four animals in three locations (Turtle Conservation Coalition, 2011). Most AA-priority species will probably be found to resemble Saola *Pseudoryx nghetinhensis* and Edwards's Pheasant *Lophura edwardsi*: these may conceivably inhabit a dozen or more landscapes (but probably many fewer) but, equally conceivably, numbers may be too low for likely recovery in any of these landscapes (SWG, 2009; Mahood *et al.*, in prep.). Non-priority AA-eligible species are more likely to have multiple potential recovery sites. Site prioritisation through biological information may be very difficult, and anyway human-dimension factors may be more important; notably, the chance and efficiency of success (Coudrat *et al.*, in press).

Incomplete information on wildlife status is problematic at many levels. On present information, it is impossible to know how many AA-priority species are in fact beyond recovery and so deployment of resources solely in their favour is not justified, how many are seriously overlooked and remain common enough not to warrant AA-priority status, and how many genuinely could vanish or, if assisted, recover. In particular, concluding that a species is beyond recovery is fraught with risks because of the difficulties of comprehensive survey and predictions of intervention success. On current knowledge, Kouprey *Bos sauveli* is a candidate for this status (Timmins, 2011), but a single chance record could change this. Past arguments were made that Asian Crested Ibis *Nipponia nippon* and Mauritius Kestrel *Falco punctatus* were doomed, but both have, through intensive management, shown high recent population growth (Conway, 1980; Burnham, 1999; Xi *et al.*, 2001) to the extent that the ibis is now merely Endangered and the kestrel Vulnerable on the *Red List*. Even determining which species might be highly at risk requires much inference. For example, Hose's Civet *Diplogale hosei* is known by only 17 museum specimens, and, before camera-trapping became widespread, very few other records; all came from a small area of north-eastern Borneo (Van Rompaey & Azlan, 2004). Taking the records to reflect its true status would consider this a very rare animal. But recent camera-trapping has found several new sites, with one such record in Kalimantan, Indonesia (Samejima & Semiadi, 2012), almost doubling the species' known latitudinal range. It remains, however, unknown why it is localised and generally at very low densities, and it is quite possible that it is seriously threatened (Mathai *et al.*, 2010). This is one of several dozen South-east Asian vertebrates with the current conservation priority being research to determine the intervention priorities and their urgency. Even more extreme, an animal as large and distinctive as the Saola remained

unsuspected by the scientific world until 1992 (Vu *et al.*, 1993). Indeed, Saola was just one of several startling discoveries in the Lao PDR–Vietnam–Cambodia area in the 1990s-2000s. Fish are particularly poorly known: for example, Kottelat (2011) estimated that 19 (11%) of the 175 fish species so far found in the Xe Kong catchment in Lao PDR were certainly or potentially unnamed. In a region with such pervasive knowledge gaps, decisions need to be taken on the best, albeit imperfect, available information. No objective process can dispel these uncertainties.

3.2 BUILDING AN ENABLING ENVIRONMENT FOR SPECIES-SPECIFIC INTERVENTIONS IN SOUTH-EAST ASIA

1. Encourage existing conservation donors to prioritise highly threatened species of South-east Asia, and, most importantly, seek additional donors to do likewise.

2. Work with donors to meet two specific funding needs for AA-eligible species: (i) a rapid-response short-term emergency/bridging fund, and (ii) longer-term funding commitments (provided progress is satisfactory), mindful of the problematic expectation of some donors (particularly those reliant on public funds) that the problem can be 'solved' in a few-year project. These two approaches have been used for over 20 years by ZGAP's [Zoologische Gesellschaft für Arten- und Populationsschutz] involvement with highly threatened species, often those with low public profiles, and with notable success. These include a number of Asian species, for example Blue-crowned Laughingthrush *Garrulax courtoisi* (Wilkinson *et al.*, 2004) and Philippine Spotted Deer *Rusa alfredi* (Heckel *et al.*, 2012). Short-term funding cycles have long been recognised as problematic (e.g. Janzen, 1986; Leisher, 2001); repackaging long-term projects every few years to fit donor expectations uses significant staff time, particularly from those individuals with most creative technical capacity, and most needed in direct implementation. Examples of long-term conservation funding in the region do exist, e.g. Allwetterzoo Münster's ongoing financial commitment to the Cat Ba Langur [*Trachypithecus poliocephalus*] Conservation Project (Schrudde *et al.*, 2010) and Twycross Zoo's long-term funding to FFI [Fauna & Flora International] for conservation of Cao Vit Gibbon *Nomascus nasutus* along the China–Vietnam border (Insua-Cao *et al.*, 2010). Perhaps more than any other NGO, WCS [Wildlife Conservation Society] has committed to long-term presence in high-priority conservation landscapes in South-east Asia (14 at present): sourcing the ongoing funds is a joint, and demanding, responsibility of field projects and headquarters. Some donors, such as the Wildlife Conservaton Network (http://wildlifeconservationnetwork.org) already do operate with a suitably long-term perspective. An investigation of why long-term commitments of donors to implementing agencies are not more widespread, with case studies of the benefits (and risks) of long-term funding, would help tackle this issue.

3. Act as a broker between individual donors, notably those intending long-term commitments or emergency funds, and individual species projects. Simultaneously work with implementing agencies to minimise the need for recurrent outside funding wherever possible, i.e. to ensure that salient local governments and other internal stakeholders assume responsibilities commensurate with their resources. Dependence on outside sources, which will necessarily remain the case for many of the AA-eligible species, brings its own risk of vulnerability to external changes.

4. Support the implementing agencies in (or, where appropriate, engage additional parties for) high-level dialogue with the region's governments to ensure their full awareness of the gravity of the regional extinction crisis and its effects on humanity at all scales.

5. Encourage the new round of National Biodiversity Strategies and Action Plans[7], national wildlife protection laws, and other laws and policies, to pay due attention to AA-eligible species conservation.

6. Provide technical, and potentially arrange financial, support to taxon-focussed overseers with AA-eligible species in their mandate. AA will not duplicate their work, but can offer support to presently under-resourced groups. Each overseeing group needs to manage a body of technical expertise on which field-based projects can draw, and act as a clearing house for species information. Currently these groups' outputs vary highly, reflecting their reliance on volunteerism (e.g. Rabb & Sullivan, 1995). Some AA-eligible species are not presently within any such group's remit, and, while this is so, AA will directly undertake species information collation and circulation.

7. Link people with shared implementation challenges; for example, most IUCN SSC specialist groups are taxonomically defined, yet information exchange between people working in a given country to save animals from different taxonomic groups is also helpful. The IUCN SSC Freshwater Committee is a habitat-based cross-taxonomic group, and many specialist groups for plants have a geographic rather than taxonomic focus (IUCN SSC, 2012).

8. Raise the profile, among conservation organisations, all sectors of governments, international bodies and the general public of the extinction crisis in South-east Asia and its effects on humanity, through both publications and media outreach, including new social media. In some cases wide awareness may not be beneficial, given how rarity often adds market value (e.g. in the captive reptile and bird trade; see above).

9. Liaise with organisations and programmes that reduce consumer demand, educate the wider public, research species conservation status and other essential thematic undertakings and, where AA can specifically and efficiently advance these programmes, do so.

3.3 MINIMISING POTENTIAL PITFALLS AND LIMITATIONS

AA faces several challenges, common to almost any collaborative programme in almost any form of sustainable development.

First is the reality that conservation organisations may fail to collaborate to the extent that might be expected. Sometimes this reflects fundamental incompatibilities between differing sectoral or organisational goals, sometimes entrenched differences in opinion of how to attain a shared goal, and sometimes an unwarranted sense of 'ownership' by an individual or institution of a species (e.g. Juniper 2002, Knight, 2006; Gerber *et al*., 2011; Nicholls, 2012). This is different from the strong sense of responsibility and other attributes of insight, charisma, hard work, persistence, flexibility, skills diversity and leadership usually found to be present in one or two key individuals involved in any successful species project. But often non-collaboration is simply an almost inevitable result of conservation taking place in open competition for insufficient resources (financial, skilled human capital, and others): being credited for success is vital to conservation bodies (e.g. Redford & Taber, 2000; Knight, 2006). A new entity, particularly one risking being perceived as appropriating the destinies of rare species, some high profile, will be less welcomed the more it is seen as a potential competitor. Open sharing of information becomes even less likely when projects risk being seen as underperforming (e.g. Redford & Taber, 2000; Knight, 2006). Linked to this, by definition the AA-priority species are difficult challenges; some will not be recoverable. An implementer, donor or other supporter taking up such a species' cause must accept that extinction may not be averted. This can be managed by explicit objective-setting, recognising that the recovery of certain species may be extraordinarily difficult, with significant likelihood of failure, even though this is unpalatable. Reflecting these linked challenges, AA must keep a low profile (despite this impeding sourcing of its own running costs), must not blur its distinctions from implementing agencies, must not seek its costs from sources already used by implementing agencies, and should remember and communicate scrupulously that its precise niche is supportive not competitive. IUCN SSC specialist groups probably have the closest remit of anything extant: catalytic rather than directly implementing, institutionally non-affiliated (despite their nesting within IUCN) by being open to people from all bodies, and facing the image-risk of being 'interfering' by having a clear, and mostly accepted, mandate to be involved.

The omens for AA in this respect are good: when the *Red List* Global Mammal Assessment highlighted the desperate situation for South-east Asia (Schipper *et al*., 2008) the major international conservation NGOs agreed broadly on the need

for, and urgency of, a cross-institutional response, and committed to participate. Regional- and national-level such bodies already exist, such as, respectively, the Global Tiger Initiative[8] and MYCAT, the Malaysian Conservation Alliance for Tigers[9] (Kawanishi & Seidensticker, 2010), as do alliances specific to issues (e.g. ASEAN-WEN[10]) and methodology (e.g. the SMART partnership for conservation monitoring[11]). Similarly, at the loss of Vietnam's last rhinoceros (Brook *et al*., 2012), nearly all conservation NGOs with a role in Vietnam of conservation of species near extinction responded favourably to the suggestion of a conservation alliance to help everyone perform better. Finally, one of the highest-profile, highest-risk species undertakings in the region – the management of Javan Rhinoceros in Ujung Kulon National Park – recently invited external assessment of the present population (Griffiths *et al*., 2012). To nurture this collaborative spirit, AA must never forget that its genesis was through the organisations that were already active.

A second stiff challenge is that while the extra money certainly needed for these species will, with sufficient determination, be sourced, it remains unclear where the necessary concomitant expansion of readily available technical competence and commitment will come from. Already many conservation projects speaking of highly threatened species do not successfully conserve them, and in some cases this reflects insufficiently experienced personnel in decision-making roles. There is wide perception in the region not just of the scarcity of trained permanent staff, but of 'off the shelf' capacity to act as technical advisors and trainers. Significant progress could be made by catalysing the relevant IUCN SSC specialist groups, and comparable bodies. Other approaches may well be needed, and this topic is a focus of ongoing AA discussions.

Third, many AA-eligible species have significant market value when dead, or are bycatch of species which do. For almost all these, present offtakes are unambiguously illegal. Irrespective of who actually takes the animals, the systems are underwritten by powerful individuals able to pay to live outside the law. Conserving these species will require these people to forego some of their illegal income. Hence AA's aim to build high-level political support for these species' conservation.

Finally, AA philosophy must remain only part of overall conservation activity, even in South-east Asia. Focus on species on the edge of the extinction (some of which will not be recoverable) risks diverting attention from next-decade's potential crisis species, and hastening their decline. Moreover, vital products of conservation, such as ecosystem services, require conservation management of large proportions of land and water, even if these lack AA-eligible species. The costs needed for single-species-focused, single-site management for all 150 Critically Endangered species of South-east Asia would be a small part of the total estimated by Bruner *et al*. (2004) to be required for effective management of all existing protected areas in developing countries and expansion into high-priority new areas. Those authors found this amount to be well within

the reach of the international community. To avert increasing risk to species facing 'next generation' imminent extinction, still today locally abundant (e.g. Red-shanked Douc *Pygathrix nemaeus*; Coudrat *et al*., in press), AA must result in additional resources (financial and technical) for South-east Asian species conservation, not reassignment of the existing sources.

3.4 A COUNTRY EXAMPLE: VIETNAM

Evolving in parallel with AA is a national approach to threatened species conservation in Vietnam, stimulated in particular by the recent loss of the country's last wild rhinoceros (Brook *et al*., 2012). This, initially independently of AA, identified many of the same issues, constraints and potential actions for averting species extinctions in the region. For about 10 highly threatened tetrapod vertebrate species, global conservation relies upon Vietnamese populations, a total exceeding that for most other South-east Asian countries. Vietnam has high biodiversity values and endemicity as well as very high threats: as well as those at global risk, many species face imminent national extirpation (Sterling *et al*., 2006). Of particular concern are Vietnam's five species of Critically Endangered endemic or near-endemic monkeys and apes, some of the most highly threatened primates globally (Nadler *et al*., 2003; Mittermeier *et al*., 2009; Rawson *et al*., 2011), and a similar concentration of high-priority turtles (Turtle Conservation Coalition, 2011).

Developing an alliance of conservation practitioners at a national scale may be more challenging than doing so regionally. Keys to success in promoting interaction between species conservation implementers for improved collaboration, sharing of technical resources and improved transparency, will include overcoming implementers' fears about an additional level of bureaucracy which brings no net benefit and the vulnerability that transparency brings in an environment where accountability is presently limited. Provision of core funding (additional to current sources) is a key desire for implementing agencies. Additional access to technical input is only variably perceived as beneficial. The unsupportive context within which conservation is implemented is perceived as the major constraining factor, with internal factors seen as secondary. Nonetheless, building a more enabling environment is a key role of this institutional alliance for Vietnam, which presently is in discussion with 54 people from 27 institutions, because it provides a united voice and message to government agencies, media and the public.

3.5 PROGRESS TO DATE AND NEXT STEPS

The information and thinking within IUCN SSC and its partners that has led to the recognition of the need for AA has already, in advance of formation of AA itself, informed the funding scope of SOS and the 2012–2013 EAZA [European Association of Zoos and Aquaria]–IUCN SSC South-east Asia Campaign. The feedback from the wider conservation community during the setting-up of these collaborations was instrumental in developing the concepts here presented, but further dialogue

is needed and is ongoing. Indonesia is vital for the future of the two South-east Asian rhinoceros species (Brook *et al*., 2012; Zafir *et al*., 2011), so IUCN SSC worked with several conservation NGOs active in the rhino areas to meet the Indonesian Vice President in October 2011; he was very receptive to the six urgent recommendations presented (Stuart & Smart, 2012). And as a result of this earlier meeting, the Indonesian President declared the International Year of the Rhino in June 2012 and, at the time of writing, appears to have adopted most, if not all, of the six recommendations delivered to the Vice President nine months earlier.

By the time of the World Conservation Congress in Jeju, Republic of Korea, in September 2012, working AA species and site lists will have been prepared. Consistent with the need for rapid and flexible response of AA these two lists will be somewhat dynamic, reflecting changes in species assessed on the *Red List* as Critically Endangered, and the fluidity in threats and their impacts. During this Congress, a meeting of available stakeholders will discuss the working mechanics of AA: precise objectives, modes of operation, governance and structure, first-year deliverables, and options for generating AA resources (including core costs). This meeting's output will be followed by extensive correspondence to ensure adequate opportunity for input by those unable to attend the meeting. Extensive discussion is particularly important for an initiative that aims mostly to support and link existing bodies (Pfeffer & Sutton, 1999). Initial AA involvement is likely to start in countries with many AA-priority species and expand to other countries only when progress in the former is consolidated.

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