



STRUCTURE



- Ministry of National Development (MND)
 - National Parks, Gardens & Nature Reserves Cluster
 - Wildlife Management
 - Center for Wildlife Rehabilitation, Wildlife Management and Outreach, Wildlife Management Research, Wildlife Trade
 - Animal and Veterinary Services (AVS) Cluster
 - Community Animal Management
 - Veterinary Science Programs, Community Animal Management Operations, Education & Engagement
 - Professional & Scientific Services
 - Animal & Vet Programme, Centre for Animal Rehabilitation, Centre for Animal & Veterinary Sciences (CAVS)
 - Veterinary Health
 - Biorisk & biosurveillance, Quarantine & Biosecurity Services
 - Industry Standards & Regulatory
 - Compliance Management, Licensing
 - Ministry of Sustainability and the Environment
 - Singapore Food Agency (food safety import & export)

POLICY

[City in Nature](#) under the [Singapore Green Plan 2030](#), National Policy [Singapore's 5-Pointed Star Green Plan](#)

This policy recognises the inter-connectedness of humans, animals, and nature while including conserving green spaces, veterinary care and animal management.

LAW

- Existing laws pertain to import and export of wildlife and protection of wildlife within Singapore. The Animals and Birds Act covers the welfare and health of all animals, including wildlife.
- Limited tools for enforcement. Need more advance science and technology tools for enforcement.
- Animals and Birds Act
- Wildlife Act
- Endangered Species Act



SOP/GUIDELINES

- Biosurveillance program
- Wildlife population management
- Rescue and rehabilitation policies

COLLABORATION & OH

- Internal collaboration mechanism with points of contact or hot-line communications
- Different priorities across ministries, challenges in gathering support and mobilising resources

Official committee/network

1. OH Framework: OH Coordinating Committee (OHCC)

- Members
 - National Parks Board (NParks) - lead
 - Ministry of Health (MOH)
 - National Environmental Agency (NEA)
 - Singapore Food Agency (SFA)
 - Public Utilities Board (PUB)
- Whole-of-government (WOG) Biosurveillance Strategic Framework - encompasses public, animal/wildlife, environmental health, and food safety to address climate-sensitive disease threats

Example of activities

- NEA assistance in identification of biting midges and sand fly

RESEARCH

- Microchipping, movement tracking, behavior study, distribution, species monitoring
- Wildlife disease surveillance

INTERNATIONAL

- Member of the Wildlife Organisation for Animal Health Working Group for Wildlife
- Member of ASEAN Coordinating Centre for Animal Health and Zoonoses (ACCANHZ)
 - ASEAN Strategy for Preventing Zoonotic Diseases Transmission from Wildlife Trade
 - ASEAN CITES and Wildlife Health Enforcement Working Group
 - Member of Southeast Asia Wildlife Health Network
 - Member of Asia Pacific Regional Wildlife Health Network
 - TRAFFIC
 - World Wide Fund for Nature (WWF)
- Stronger regional initiatives needed through engagement with relevant stakeholders and addressing social and cultural factors on disease emergence

PRIVATE

- Rescue centers
- Zoo

FINANCIAL

- Consistent funding that meets operational needs
- Emergency funding is available
- Biosurveillance receives most funding
- Funding for mangroves

PHYSICAL

- Sufficiently equipped
- Laboratories are available and is shared across agencies in NParks

HUMAN

- No dedicated division for wildlife health
- Inefficient manpower
- Rescue and rehabilitation - 2 persons
- Biosurveillance - 5 to 6 persons
- Laboratory - 5 to 6 persons
- National Veterinary Team distributed among NParks divisions

ANIMAL HEALTH

- Wildlife vaccination is not practiced
 - Difficultly obtaining high dosage drugs for sedation purposes of large animals (only zoos has access)
 - Biosurveillance measures: Import measures, quarantine, surveillance, no zoning practices
- Government**
- [Centre for Wildlife Rehabilitation](#)
 - Veterinary care, rescue, rehabilitation, and relocation
 - Testing of important diseases in wildlife, domestic animal, and humans
 - Results guide risk assess and management measures. Eg. vs programmes, biosecurity practices for animals
 - Identify potential disease threats, monitor, respond, and manage
- Non-government**
- Zoo (with a wildlife hospital)
 - Veterinary clinics (usually avian; exotic pet species are generally not allowed in SG)

ANIMAL WELFARE

Part IV: Animal Welfare and Prevention of Cruelty to Animals

"animal" includes any bear, bird, fish or reptile, whether wild or tame

Strengths

- Disease diagnosis
- Wildlife rescue and rehabilitation
- Wildlife forensic
- Biosurveillance

SURVEILLANCE

- Aim: To identify the absence/presence of disease and why it happens
- Ongoing work: Developing standards for eDNA

Whole-of-Government (WOG) Biosurveillance Strategic Framework

- encompasses public, animal/wildlife, environmental health, and food safety to address climate-sensitive disease threats
- four strategic thrusts of scanning and early detection, management of foci and vectors, inter-agency information integration, and science and technology
- Situational and Risk Assessment Report for One Health Hazard

Passive surveillance

- Traditionally pathogen-based surveillance
- Increasing syndromic surveillance to target all potential hazards (stakeholders are aware and monitor baseline vs disease symptoms and notify)
- Reports from communities

Active surveillance

- Pathogen-based surveillance + ecological data
- Aquatic facilities
- eDNA collection from environment (ePAQ)

Disease specific

- All and wild bird migratory flyways
- ASF and wild boar population dynamics
- Leptospirosis serovar and serotypes (Rodents)
- Dengue
- Zika Virus
- Japanese Encephalitis Virus
- Nipah Virus
- Coronavirus
- SARS-CoV2

LABORATORY

- Main laboratory in NParks is ISO17325 accredited
- BSL-1 and BSL-2 laboratories shared across agencies under NParks
- The cold chain is diligently maintained, and timely delivery of samples to laboratories is ensured

Other laboratories

- Mandai zoo
- Universities (transmission studies)
- Commercial diagnostic labs are being established and can accept wildlife samples
- Laboratory network: ASEAN Laboratory Director Forum Member, ties with Australia

DATA

- Managed by NParks
- Internal government databases from geospatial platform

REPORTING

- Pathogen-based
- Public hotline or online form
- Communication within and between agency through call
- Same point of contact in all agencies

RISK ANALYSIS & ZOOSEOS

- Emphasis on systems approach
- Focus on urban ecology due to frequent contact at the human-animal interface
- Disease Prioritization → Target at risk population → Surveillance
- Predictive risk mapping and disease forecasting
- Joint risk assessment with OH agencies

RESPONSE

- Response plans covers all species (including wildlife)
 - Includes: euthanasia, logistic, isolation, surveillance, stakeholders involvement
 - Point of contact for risk assessment
 - Contingency plans available and updated (eg. AI and ASF)
 - Field personnel are equipped with sampling kit

ENVIRONMENT

- Integrated into risk assessment + climate and disease indicators

ASSESSMENT

- Not performed

TRAINING

- Veterinary technician course - focused on companion animals. More wildlife modules should be incorporated
- No veterinary medicine course in Singapore
- Training
 - Field Epidemiology Training Program
 - Animal Health Training

TRACEABILITY

- Not discussed

COMMUNICATION

- Advice on human-wildlife interaction (without causing alarm, less emphasis on wildlife disease)
- City in Nature policy