Bracing for Superbugs: Strengthening environmental action in the One Health response to antimicrobial resistance

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Bracing for Superbugs: Strengthening environmental action in the One Health response to antimicrobial resistance

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Ecology of AMR Spread: Environmental Dimensions

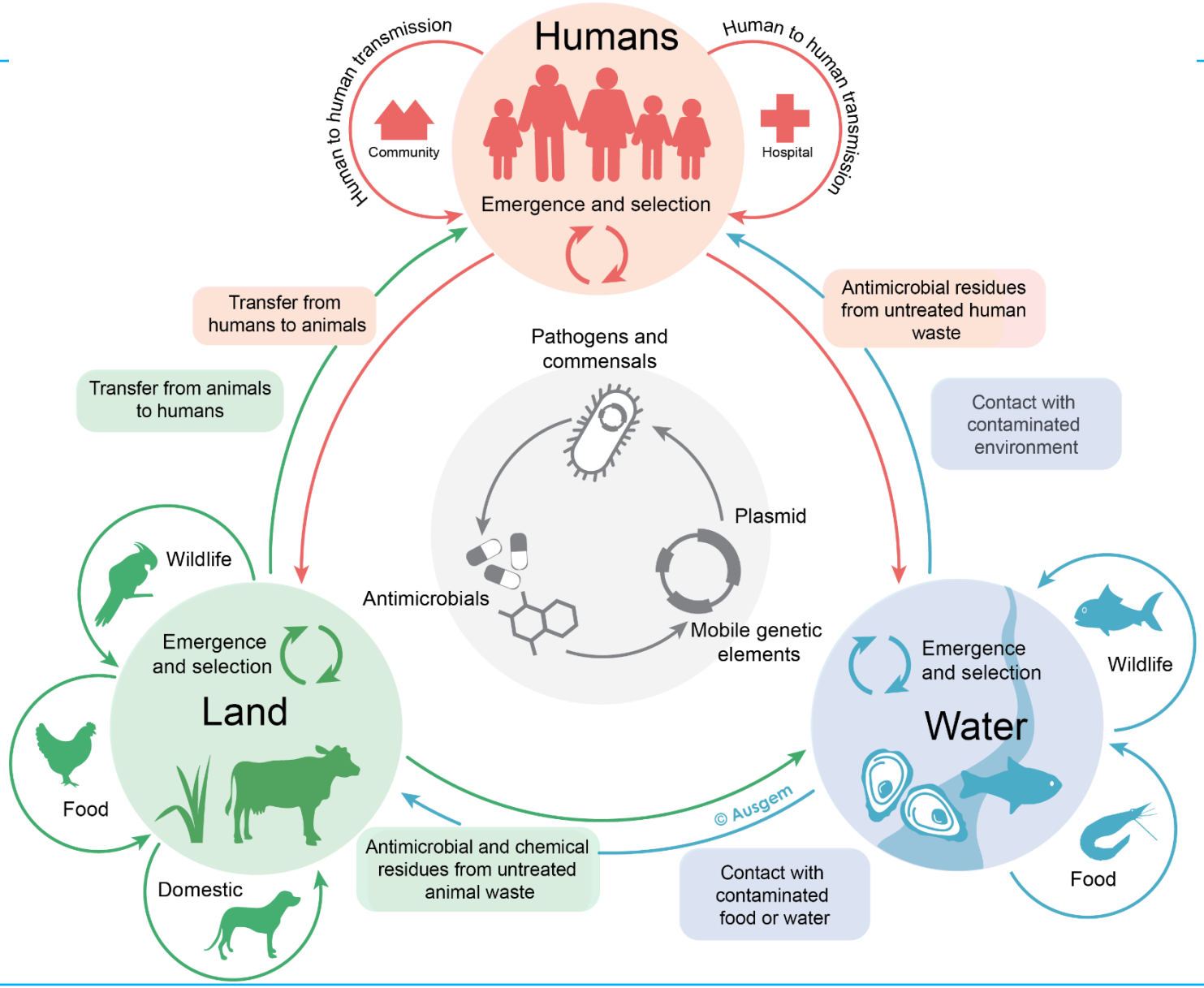

Figure adapted from The Australian Centre for Genomic Epidemiological Microbiology (ausgem.net). Courtesy of Dr Branwyn Morgan.

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Key Environmental Dimensions of AMR

Broadly, three-fold:

-The environmental ‘microbial world’ is the source of genetic material that confers resistance to antimicrobials, and the machinery that underlies genetic transmission.

-Various anthropogenic pressures (e.g., chemical and biological waste streams) are potentiating or aggravating the problem.

-The environmental dispersal of AMR via water, air, soil, wildlife, etc. is crucially important for the transmission and spread of AMR.

The environment plays a key role in development, transmission and spread of AMR

AMR and the Triple Planetary Crisis - Unsustainable Consumption and Production Patterns

Climate change

- Some pathogens are more persistent in the environment at higher T
- Extreme weather events can contribute to development and movement of AMR microorganisms
- Antimicrobial impacts on microbial biodiversity may affect carbon and methane cycles

Loss of biodiversity

- Loss of ecological resilience, more opportunity for pathogens to proliferate

Pollution and waste

- Chemicals (co)selecting for AMR
- AMR microorganisms enriched for in humans or animals, corresponding wastes contaminate the environment

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The Environment and AMR

Waterborne transmission and spread in particular.

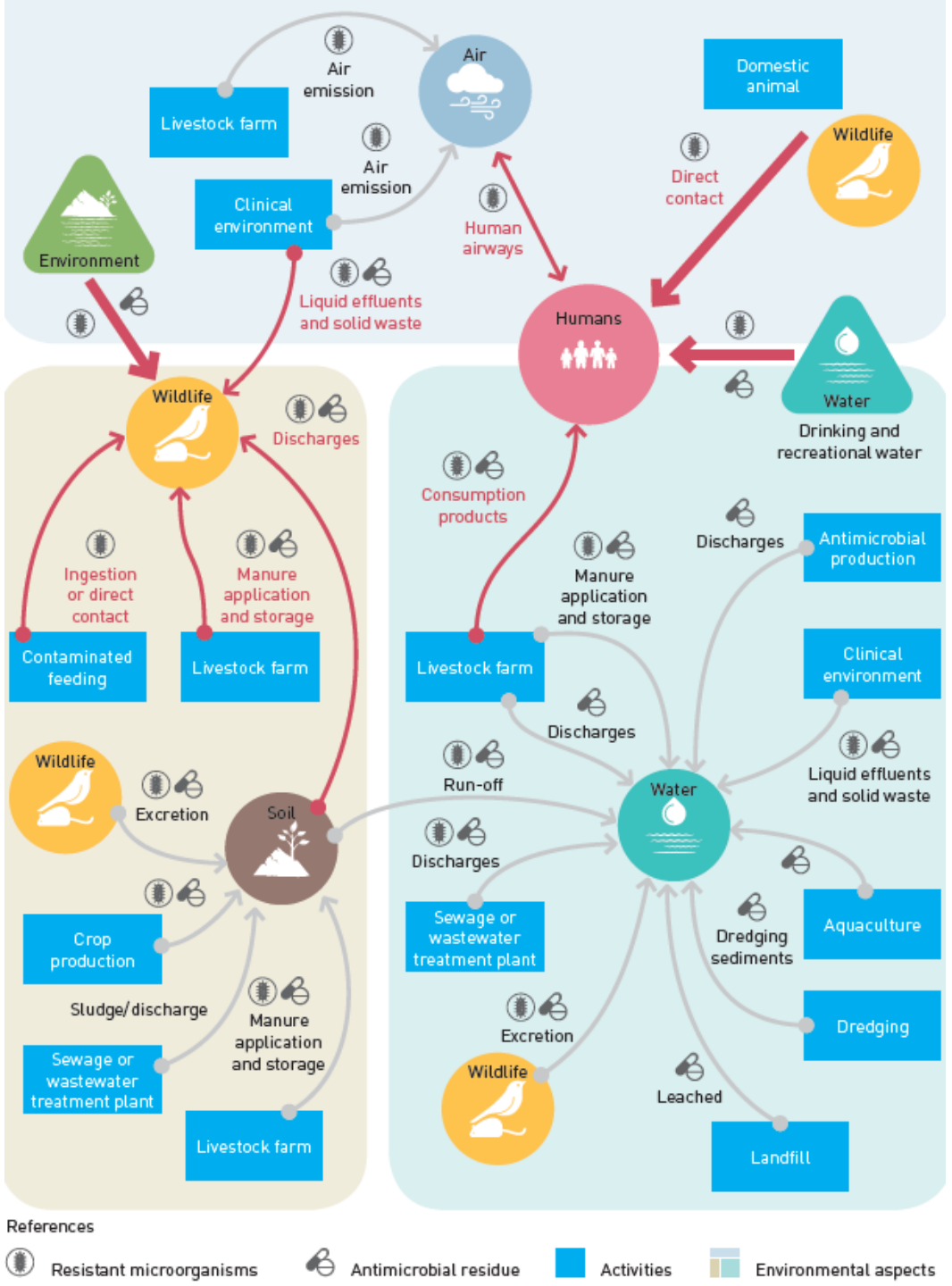
-Importance of waste, wastewater and water, sanitation, and hygiene (WASH).

But also:

-wildlife

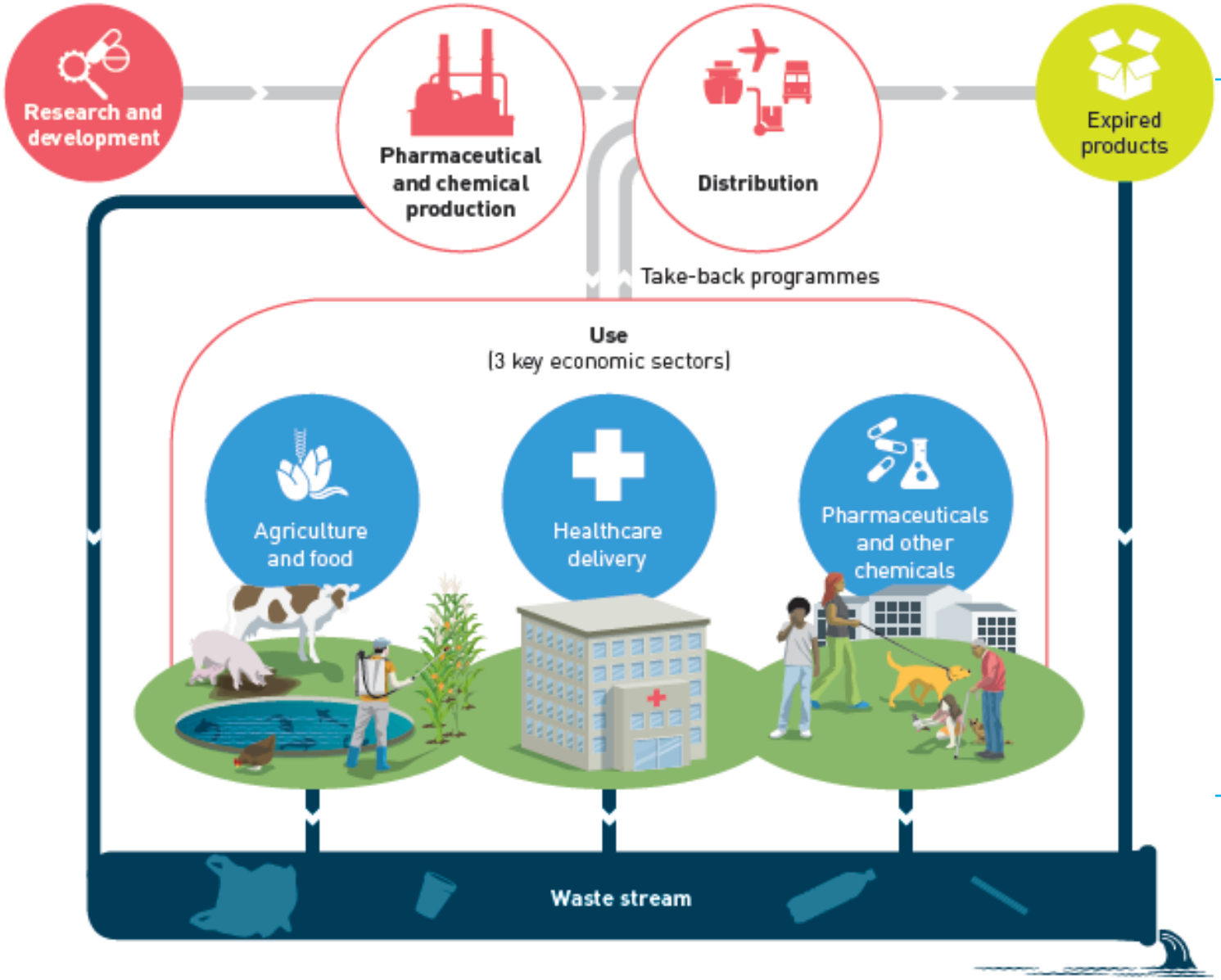
-airborne

-soilborne



Managing Sectors and their Value Chains that drive AMR Development and Spread in the Environment

- Pharmaceuticals and other chemical manufacturing
- Agriculture and food production
- Healthcare systems



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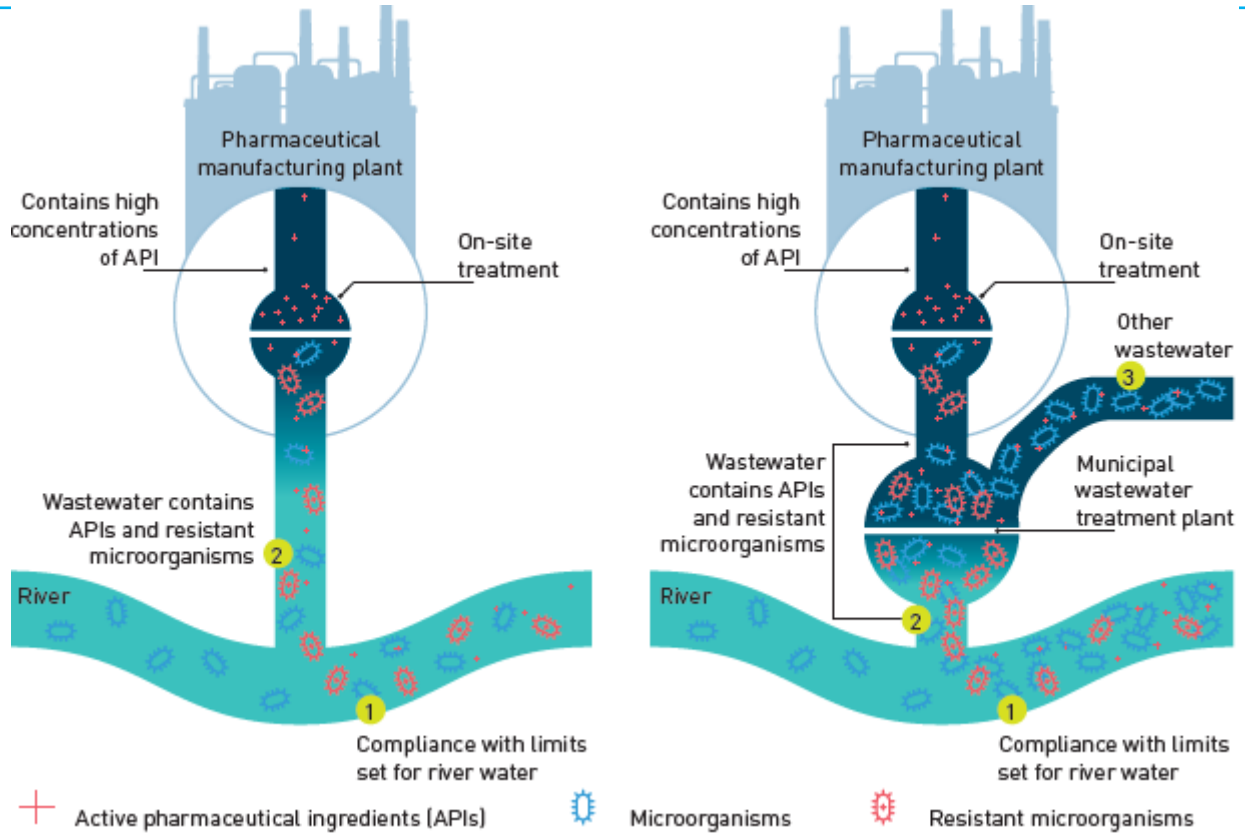
Pharmaceutical Manufacturing and Other Chemical Value Chains



Management options include:

- Embed waste management and a lifecycle approach into standard operating procedures in antimicrobial production.
- Promote waste treatment technologies that reduce AMR discharges to the environment.
- Develop and enforce targets/standards to minimize antimicrobial discharges.
- Improve supply chain transparency (e.g., data sharing on production sites, amounts produced, wastes emitted).
- Monitor antimicrobial residues, resistant microorganisms, ARGs and MGEs in the environment near production plants.

Access to Medicine Foundation 2021

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Agricultural and Food Value Chains – Antimicrobials and Manure in Crop Production and Waste and Other Releases from Animal Production

Management options include:

- Reduce antimicrobial use in food animals by improving animal health.
- Control of non-point sources chemical and biological releases to the environment
- Improve management of fertilizers of faecal origin; create barriers to AMR spread from operations.
- Increase targeted pre-treatment of waste across the farm to slaughterhouse continuum.
- Provide barriers or treatment of water entering and exiting aquaculture facilities.
- Also consider antimicrobial/fertilizer/chemical use in food crops, ornamentals, etc.

Food Production Environments: ‘Hotspots’ for AMR Development and Key Routes of Transmission to Humans

- Use of antibiotics and fungicides in terrestrial environments for production of plant-based foods.
- Use of antibiotics and parasiticides in aquatic environments for production of finfish and crustaceans.
- Role of the environment in contaminating food with AMR.

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Healthcare Value Chains – Antimicrobial Use, Waste and Effluents from Health Care Facilities

Management options include:

- AMR-targeted, on-site treatment of hospital wastewater to prevent spread into the environment.
- Proper disposal and treatment of antimicrobial medicines and hazardous waste from facilities.
- Encourage sustainable procurement and sound management and disposal of antimicrobials by healthcare systems.
- Leverage hospital stewardship and infection prevention control programs to limit environmental contamination by AMR pollutants.

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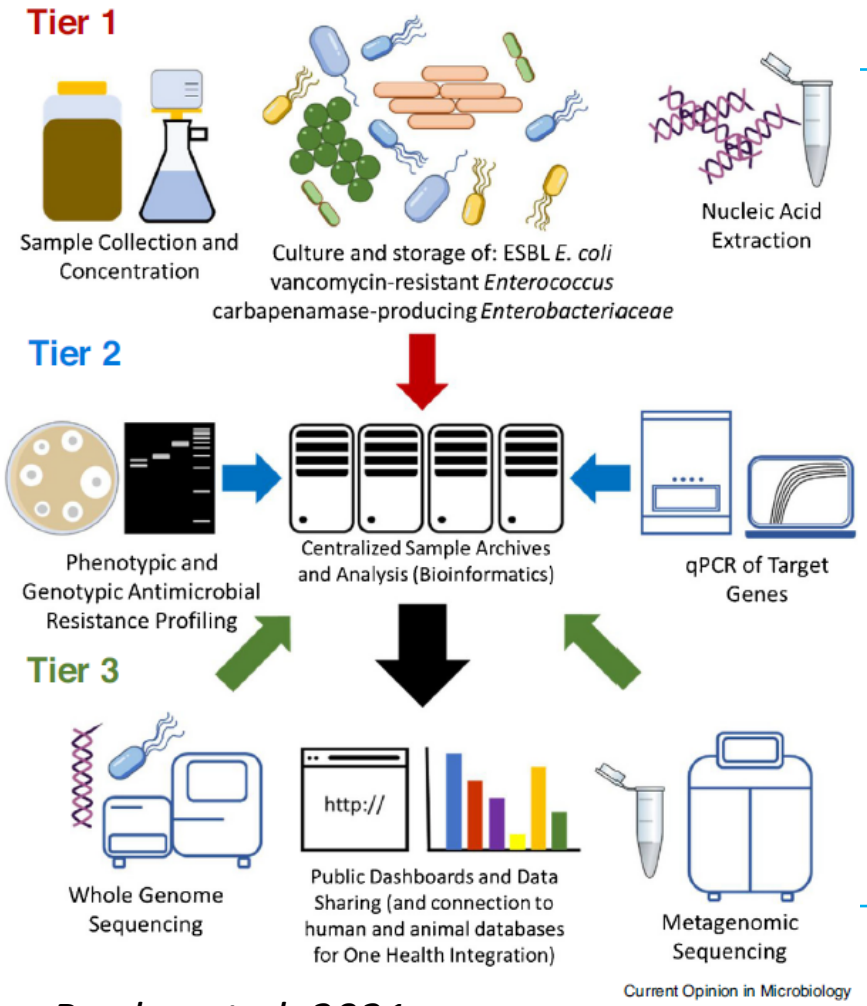
Evidence to Inform Policy

Evaluation of risk, and validation of risk reduction must be done on the basis of the best science and available data, which is evolving.

- Coordinated surveillance
  - E.g., QJS-AIS, NARMS
- New technologies e.g., Genomics
- Risk science
- Internationally accepted standards



Pruden et al. 2021

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Concerted Action: Global, Regional, National, Local

In planning and governance…

- The environment is being strengthened in the **global** governance structures e.g., GLG
- **Regional** level ministerial conferences offer a possibility for mobilizing and strengthening further action on the environmental dimensions of AMR
- AMR **National** Action Plans should feature the environmental aspects of One Health, e.g. multi-sectoral coordination committees/mechanisms, surveillance, innovation and research pillars.
- **Local** action can be extremely impactful, e.g. WASH

United Nations Environment Programme (UNEP)

authoritative advocate for the global environment

For People and Planet:
UNEP Medium Term Strategy 2022-2025

Source: UNEP Medium Term Strategy 2022-2025

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Priority actions

- Enhance environmental governance, planning and regulatory frameworks
- Identify and target priority AMR relevant pollutants - PREVENTION
- Improve reporting, surveillance and monitoring
- Prioritize financing, innovation and capacity development

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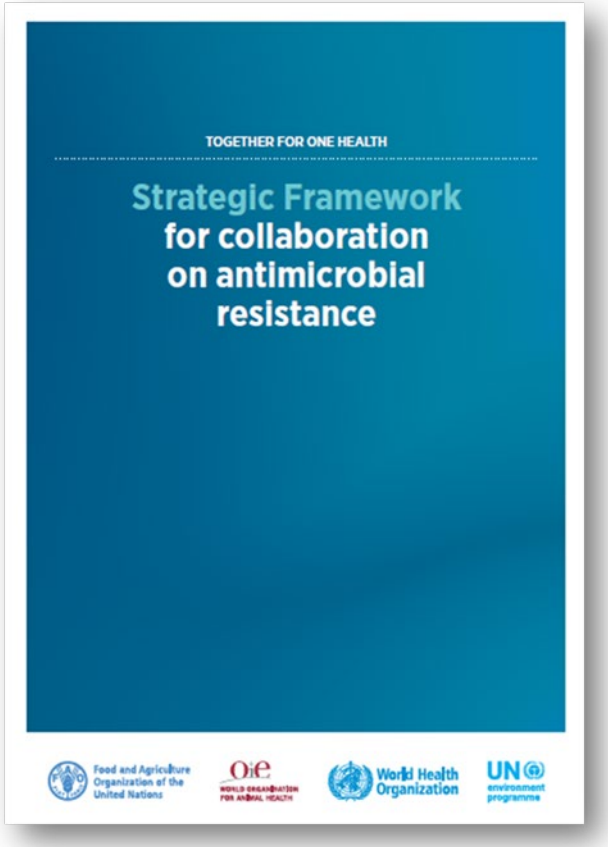
The Strategic Framework for Collaboration on AMR



The Strategic Framework was developed through a participatory process led by the Joint Secretariat involving staff engaged in AMR across all levels of the four organizations

- Presents the background and context for the collaboration between FAO, UNEP, WHO and WOAH on AMR;
- Describes the comparative advantage and catalytic role of the four organizations in the One Health response to AMR in support of efforts by their Members, civil society, the private sector and other stakeholders.

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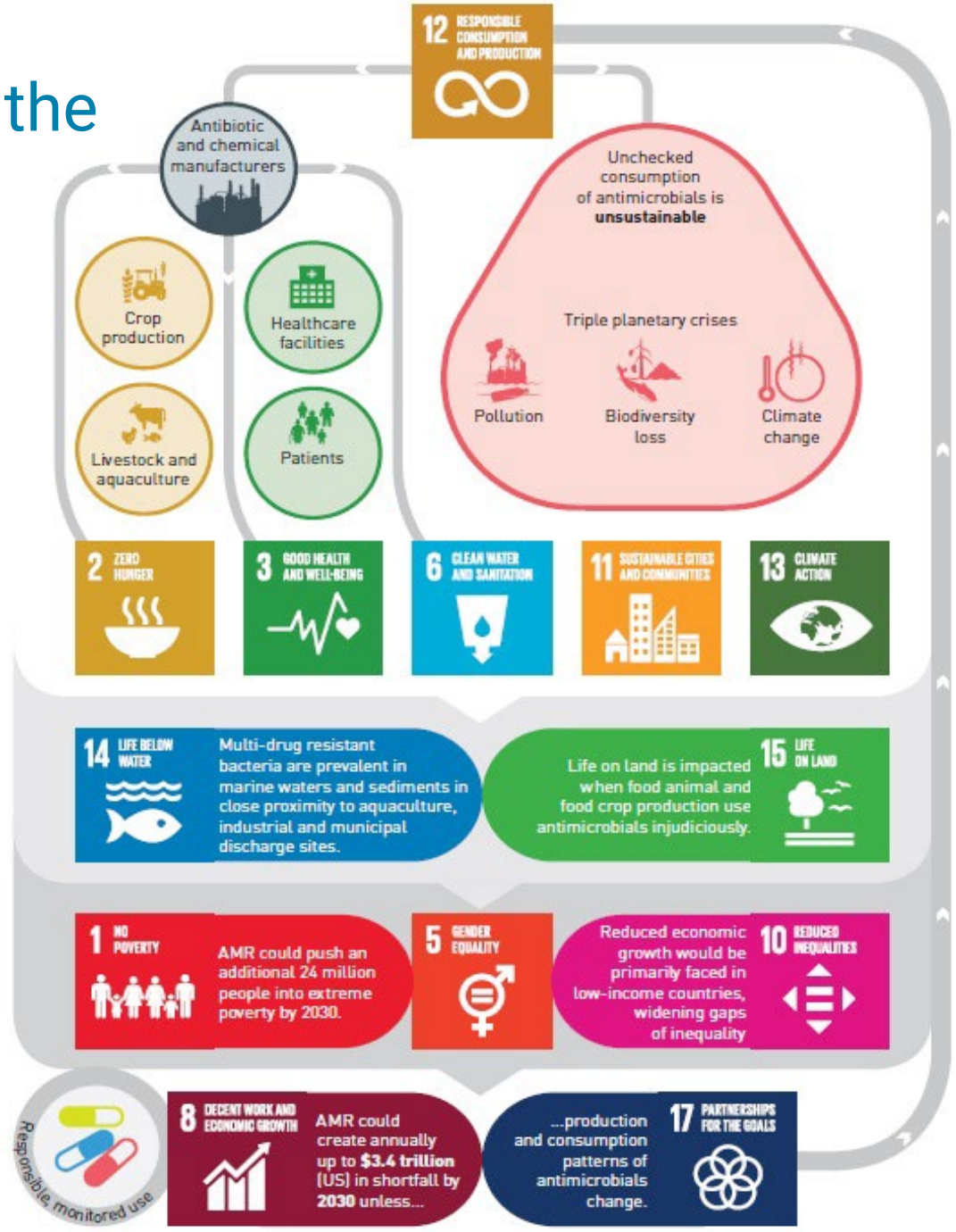
AMR and Environment in the Context of the Sustainable Development Goals (SDGs)

AMR can undermine the achievement of several SDGs

Delivering on the SDG policy objectives can mitigate environmental AMR and vice versa



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Thank you

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