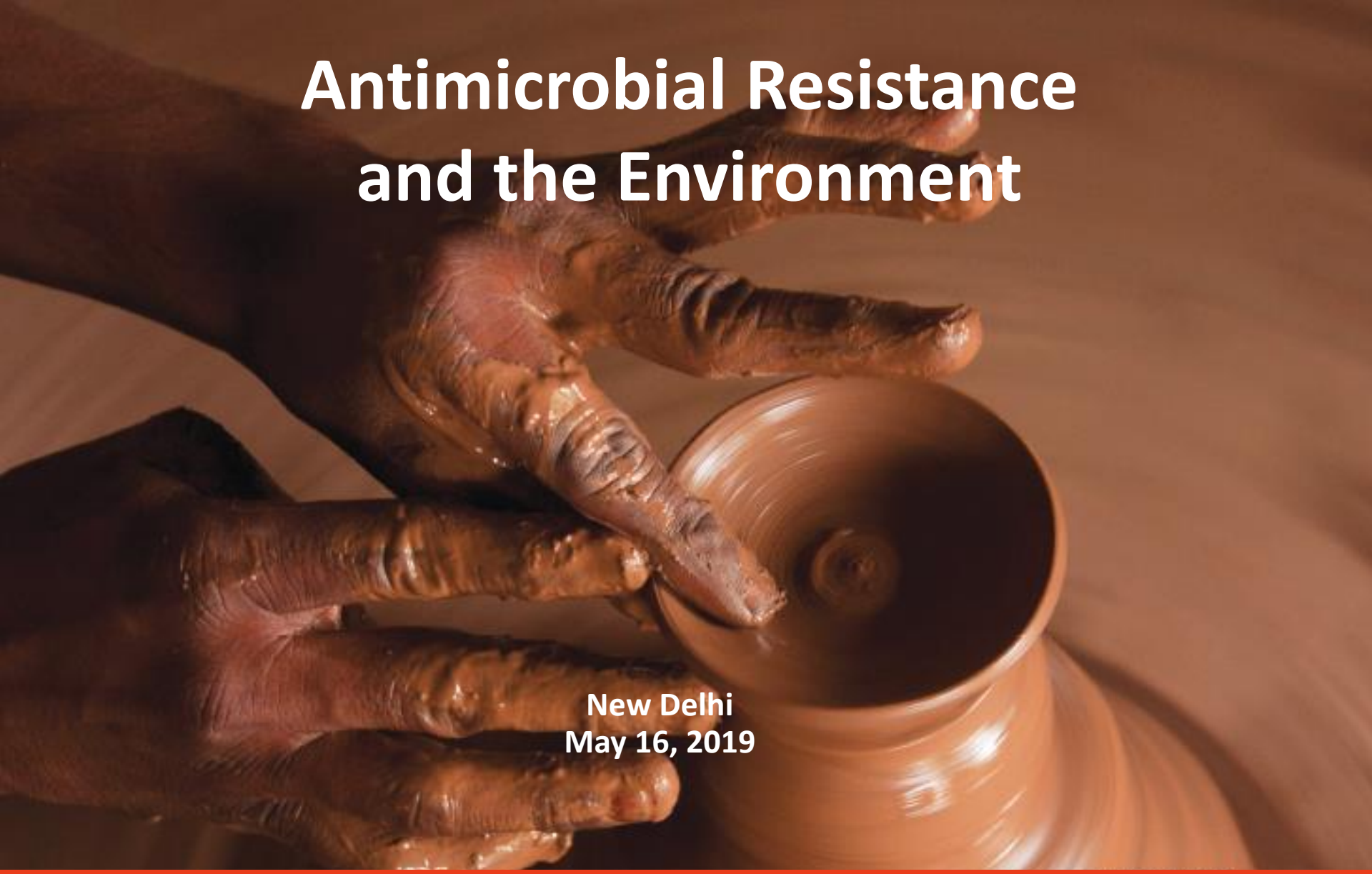
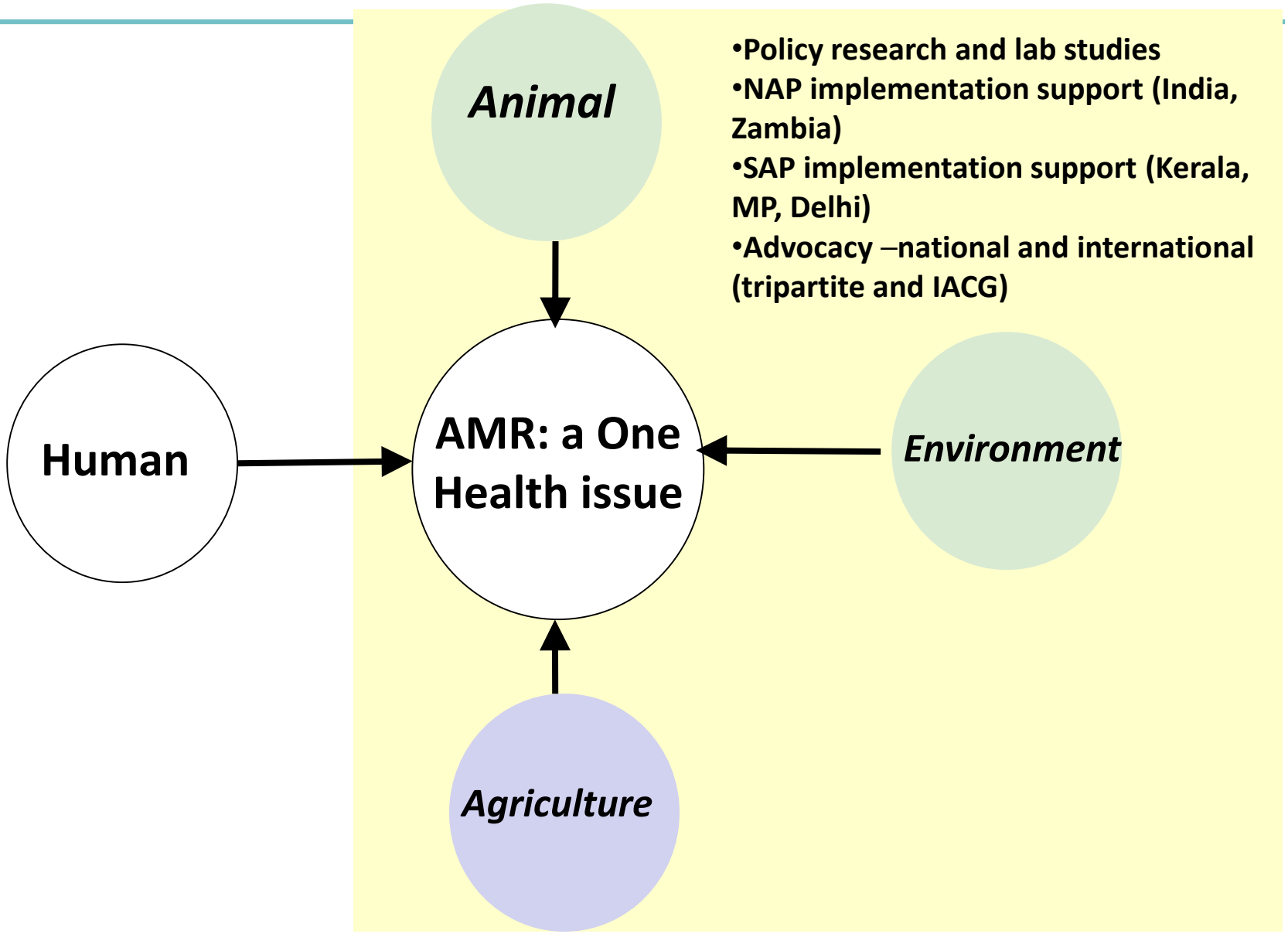
Antimicrobial Resistance and the Environment



New Delhi
May 16, 2019

Chandra Bhushan
Deputy Director General, Centre for Science and Environment

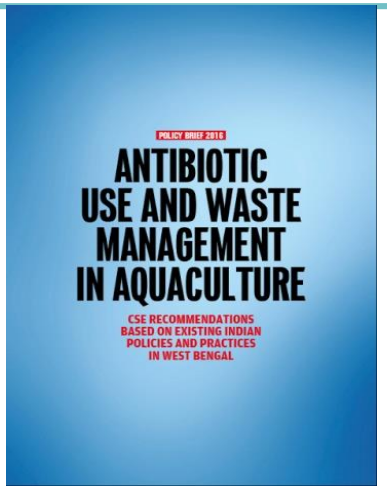
Focus areas w.r.t Antimicrobial Resistance



Studies on AMR

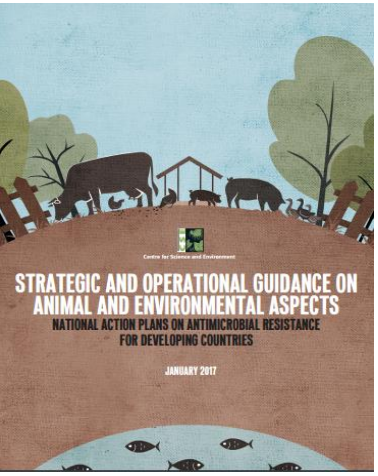
2010

2014



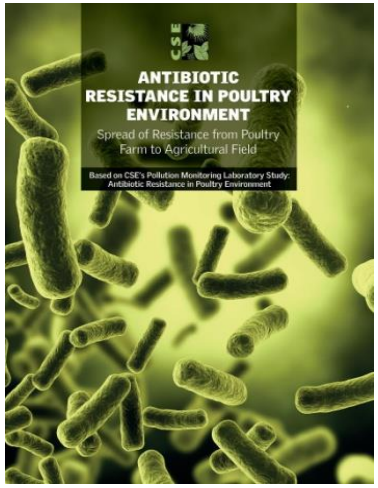
2016

2016



2016-17

2017



2017

2017

Integrated AMR Surveillance Framework

2017-18

Environmental dimension of AMR needs to be prioritized

- Environment is at the receiving end of what we do **(sink)**
  - It is a big pool of AMR determinants: antibiotic resistant bacteria, antibiotic resistance genes and antibiotic residues
- But it also a **source**
  - Poultry litter used as manure in agricultural farms and also in fish farms
  - Treated effluent from CETP/STP into rivers become input water in fish farms/fields
- However, limited focus on management of waste (such as from farms, factories, households and healthcare settings)
  - Even the effectiveness of waste treatment plants is now being questioned
- Limited guidance on how to go about environmental surveillance and setting discharge limits of AMR determinants in waste
- **Environment possibly a big contributor to AMR in India. Largely unsanitary conditions, high bacterial growth; are among top producers of dairy, fish, poultry and antibiotics. But on the other hand we cook our meat.**

AMR-centric approach in waste management required; antibiotics residues & resistant bacteria/genes in environment should be "hazardous".

Status in India

Standards not aimed to address AMR	• General wastewater and industrial effluent standards confined to parameters like **BOD, COD, suspended solids** etc. • **Draft standards** for residual antibiotics in pharma industry developed; yet to be notified by the MOEFCC
Waste from farms not on radar	• Farms considered agriculture; **regulator's mandate** is **trade/industrial** effluents • Poultry and hatchery categorized '**green**'; aquaculture not categorized at all – in pollution-causing potential classification • Slaughter house as '**red**', fish processing as '**orange**' – **But not due to AMR**
Limited awareness – environmental policymakers and regulators	• **Historic focus** on pesticides, heavy metals etc. • Understanding **limited to antibiotic residues** in pharma waste –but more as an industrial waste; no standards and monitoring though • Limited laboratory preparedness on **microbiology-related** aspects

India's NAP-AMR aims to address the environmental dimension at a broad level; momentum yet to be seen

MANAGING AMR IN ENVIRONMENT

- **Integrated framework for policy, systems and tools**
- **Integrated AMR Surveillance Framework**

Managing AMR in the environment – Framework for policy, systems and tools

INTERVENTION AREAS

- **Policy/law/ regulations/ standards/ programmes**
- **Implementation tools- Infrastructure/ capacity/systems/ resources**
- **Advocacy/ awareness and education/ training/curriculum**
- **Record keeping/ database generation/ collation/ dissemination and research/survey**
- **Review/monitoring /feedback**

Responsible Antibiotic Use in Food Animals

THEMATIC AREAS				
Supply of antibiotics	Production Systems			Consumers
	Reduce need for antibiotics	Veterinarians and veterinary services	Farms and farmers	

Surveillance of Antibiotic Use, Residues and Resistance

THEMATIC AREAS			
Antibiotic use in food animals	Antibiotic resistance in animals and food from animals	Antibiotic residues in food from animals	Environmental surveillance of residues and resistance

Environment Management to Contain Antimicrobial Resistance

THEMATIC AREAS			
Registration/ licensing (based on environment risk assessment)	Biosecurity/ sanitation and hygiene/good manufacturing Practices	Waste management	Research

Short-term **(S)**: <1 yr; Medium-term **(M)**: 1-3 yrs; Long term **(L)**: 3-5 yrs; Continues throughout: **(S-M-L)**

Managing AMR in the environment – broad structure for surveillance

Point Sources				Non-point Sources
Farms	Factories	Households	Healthcare Settings	
Waste from: Animal farms – poultry, dairy, pig, fish etc. Agriculture farms	Effluents from: Pharma manufacturing Feed mills Slaughter houses Processing units (meat, dairy) Common effluent treatment plants (CETPs)	Effluents from: Sewage treatment plants (STPs) reflecting domestic sewage and disposal of ususued, expired drugs	Hospital sewage Waste from veterinary care settings	Rivers, Reservoirs Groundwater Agricultural soil

Surveillance of antibiotic resistant bacteria, antibiotic resistance genes and antibiotic residues

Elements of successful surveillance programme

- **Convergence and supplementation**
  - Coordination and integration of available infrastructure and resources and filling the gaps
- **Progressive and phased approach**
  - Ambitious in view of the complexity and burden of the problem, which is gradually scaled-up in view of local constraints and realities in India
- **Specific and comprehensive**
  - Roles, accountability, timelines

Managing AMR in the environment

Approach for surveillance

1. Identify target bacteria and antibiotics
2. Identify sampling location, sample type, sample size, collector
3. Standardize and harmonize testing method(s)
4. Develop and operationalise laboratory network(s)
5. Harmonized data analysis and period reporting, available in public domain

Thank you!

Chandra Bhushan
Deputy Director General
Centre for Science and Environment
41, Tughlakabad Institutional Area
New Delhi 110 062
Tel: +91-11- 4061 6000 (Extn:297)
Fax: +91-11- 2995 5124
www.cseindia.org

E- mail: chandra@cseindia.org
Website:www.chandrabhushan.net
Skype Id:csechandra