

2019 Water JPI Workshop on International Cooperation
25th June



EXPERIENCE IN PARTICIPATING IN 2017 WATER JPI PROJECT

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Overview of the IDOUM Project

Innovative, **D**escentralized and low cost treatment system for **O**ptimal **U**rban wastewater **M**anagement
(IDOUM)

Main Goal



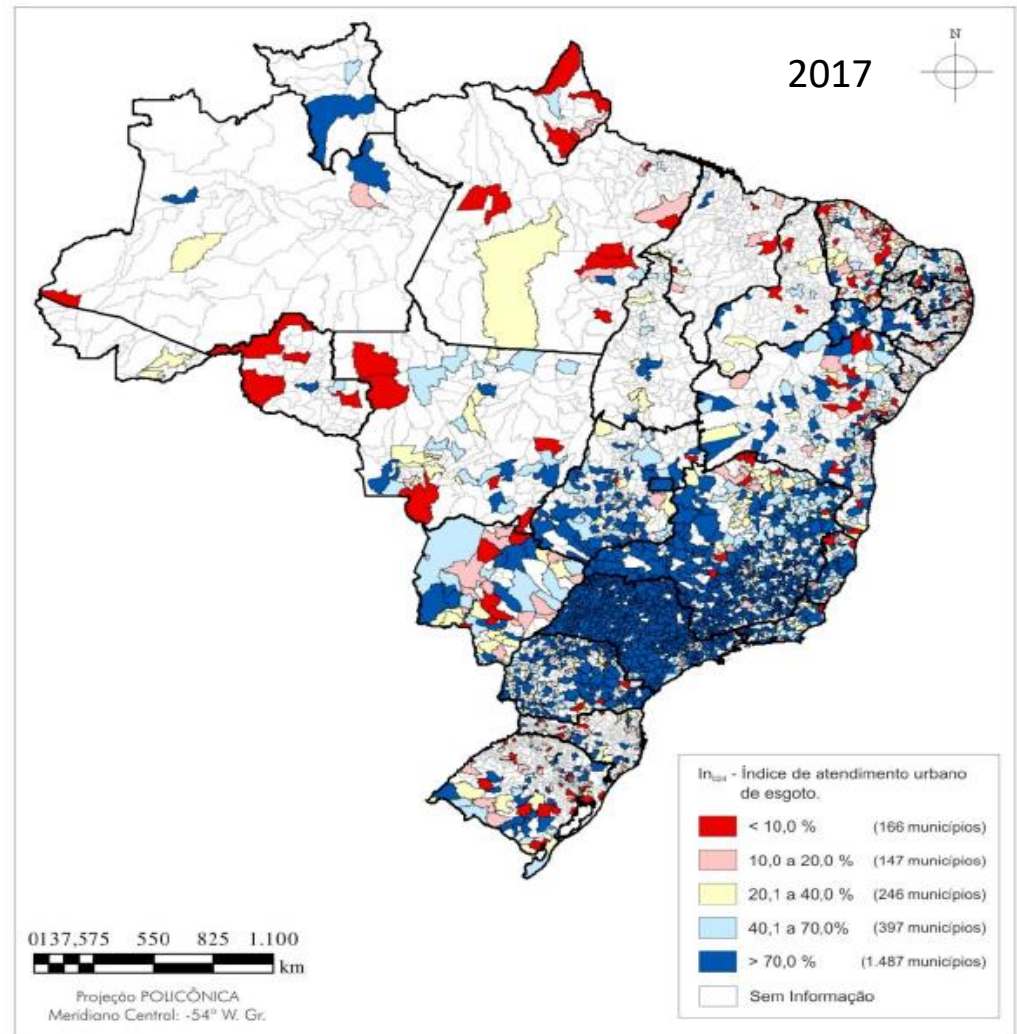
To develop hybrid systems for wastewater treatment technologies to provide water of optimum quality for non-potable reuse

Sewage treatment in Brazil

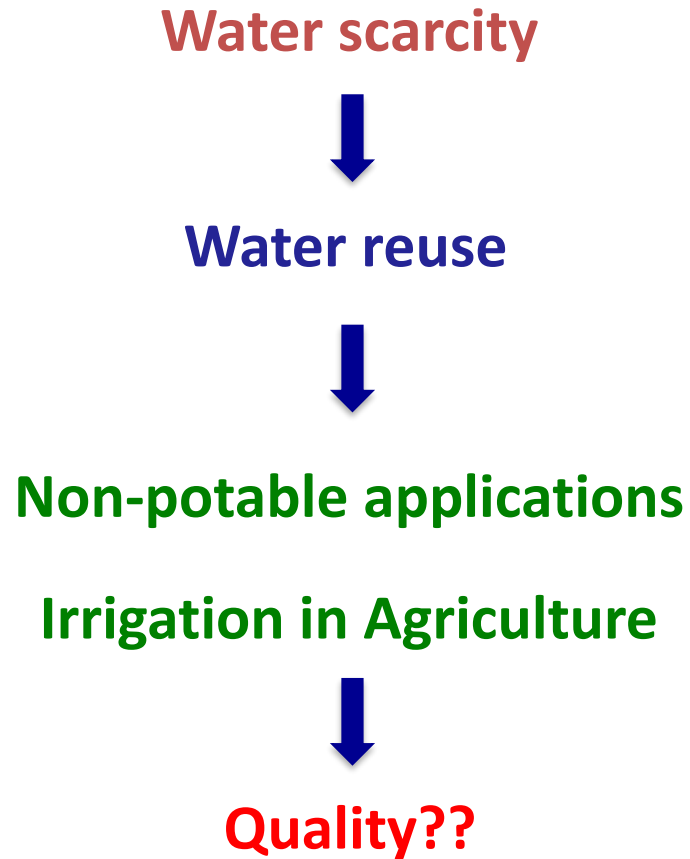
Sewage treated in relation to generated in 2017: 46%

Source: National System of Sanitary Information (SNIS- www.snis.gov.br)

Urban sewage service index (IN024)



Water crisis in São Paulo State Brazil (2014)



Threat ⇒ emerging contaminants,
specially **antibiotics**



By POON CHIAN HUI
 A NEWLY found superbug from India that has been making news around the world infected two patients here early this year - before anyone knew what they were dealing with - but was successfully dealt with and contained.
 The Ministry of Health (MOH) told The Straits Times that the patients had infections from bacteria with the New Delhi metallo-beta-lactamase-1 (NDM-1) gene identified last month.
 The gene has the ability to shield bacteria from all antibiotics, turning them into drug-resistant superbugs.
 It was found in the samples from the two patients last month, after hospitals went back and tested past samples.
 "Following reports of NDM-1 in other countries and the availability of newer and more sensitive tests, our hospitals found two cases from the beginning of this year that were positive for NDM-1," said an MOH spokesman.
 One was a Singapore resident who had sought medical treatment in India, while the other had come to Singapore from Bangladesh for medical treatment.
 They had been admitted at different times to the Singapore General Hospital.

New superbug found in two patients here

resistant bacteria when they showed signs of illness besides the one they had gone in for - an indication they might also be infected with a superbug.
 Both were quickly isolated from other patients after bacteria in their urine samples were found to be resistant to drugs.
 MOH said they were moved to single-bed rooms and had limited contact with visitors.
 Health-care staff who attended to them also donned protective gear such as a gown and gloves at all times.
 Both patients were discharged when subsequent urine tests showed no further growth of the bacteria, said MOH.
 It is not known what other treatment

Both cases successfully contained as experts urge health officials to track deadly bacteria

that strict hospital infection control measures are the key to fighting superbugs.
 One measure is the retroactive testing of bacterial samples, following the discovery of a new mechanism for bacterial resistance.
 Strains with unusual antibiotic resistance are stored for future study, said the

NDM-1 made the headlines after a study published on Aug 11 in The Lancet medical journal said the gene was detected in British patients in 2007, and appeared to have originated from India. So far, it has occurred mainly in two gut bacteria - *Escherichia coli* (E. coli) and *Klebsiella pneumoniae*.
 The news triggered a global reaction as NDM-1 is able to resist even the most powerful class of antibiotics known as carbapenems.
 Cases have now been reported in places such as the United States, France, Germany, Australia, Hong Kong and Japan. Last month, a Belgian man became the first known fatality.

Antimicrobial Agents and Chemotherapy urged the health authorities to track bacteria with the gene.
 The conference in the United States, which ended yesterday, is the world's largest gathering of infectious disease specialists, attracting about 12,000 people.
 Drug-resistant superbugs are not new and include methicillin-resistant *Staphylococcus aureus* (MRSA) and *Pseudomonas aeruginosa*.
 MRSA is a serious infection found mostly in hospital settings, while the latter usually infects the lungs.
 The NDM-1 gene is a part of a bigger problem of drug resistance brought about by the abuse of antibiotics worldwide.
 To fight the spread of these bugs, local hospitals have comprehensive infection control measures.
 Hospital staff practise strict hand hygiene and are audited regularly.
 Inpatients are also screened for existing superbugs such as MRSA.
 There are also antibiotic stewardship programmes to help doctors prescribe the right type and dosage of antibiotics to minimise the rise of drug resistance.

New Delhi superbug is no threat to Europe

SYED AKBAR
 DC | HYDERABAD

April 14: The Lancet study on NDM-1 in India notwithstanding, different types of metallo beta lactamase, the protein that makes an ordinary bacteria a drug resistant superbug, exist 10 to 100 times more in Europe.
 According to Dr Niyaz Ahmed, editor of *PLoS ONE*, a leading biomedical journal published from the USA, various types of metallo beta lactamases like bla-VIM, bla-KPC and some OXA types have been in circulation around the world for many years. Type OXA-48 is found in many and

bacteria prevalence
 The estimated prevalence of NDM is less than 0.1 per cent in Germany, as against other metallo beta lactamase types whose occurrence is about 10 to 100 times higher in countries such as Cyprus.

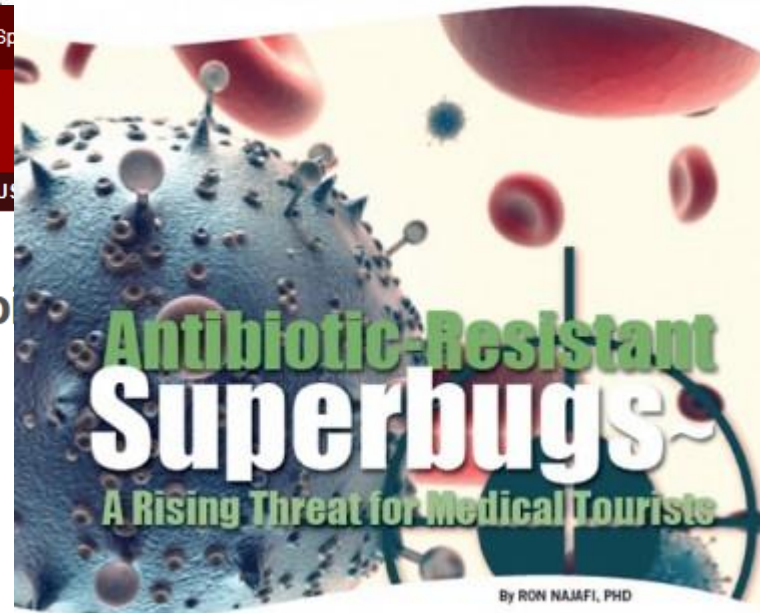
The estimated prevalence of NDM is less than 0.1 per cent in Germany and other European countries, as against other metallo beta lactamase types whose occurrence is about 10 to 100 times higher in countries such as Cyprus.

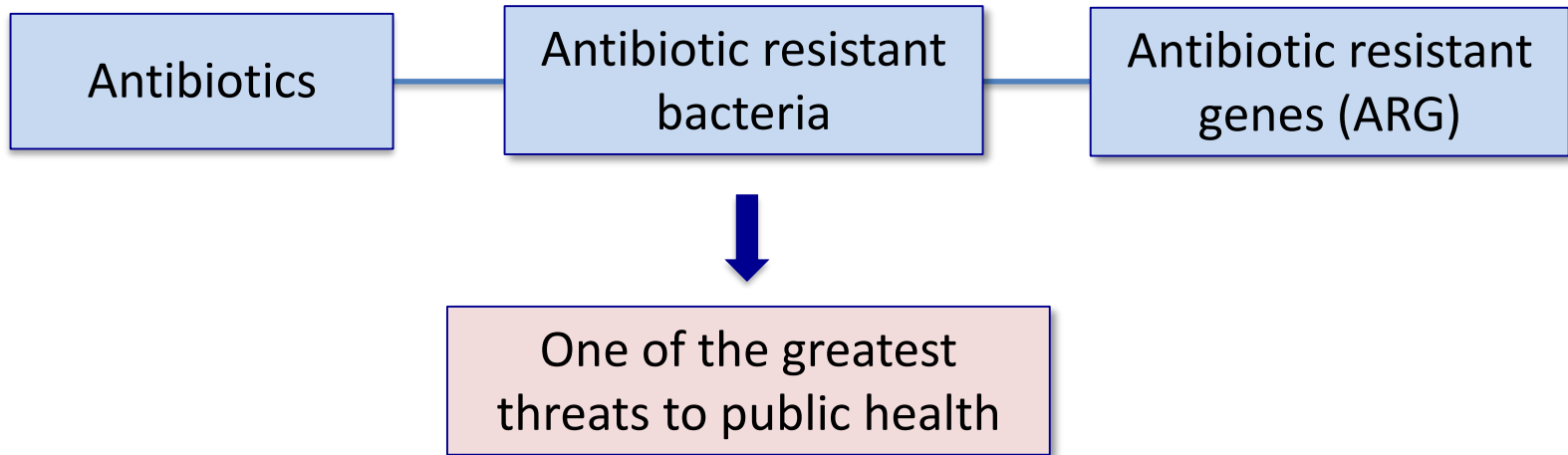
beta lactamases are also present in other developed countries like Japan and the United States.
 "NDM-1 is a world-wide problem although much caution is warranted as it is a worrisome situation for India due to the current stigmatisation by the Lancet studies. But, what about all other metallo beta-lactamases circulating around the world since many years - why didn't these carbapenemases evoke such a hype," he wondered.
 Dr Niyaz Ahmed allayed the fears saying that bacteria living outside the body do not necessarily cause health

12 | Folha de S. Paulo
 Quinta-feira, 14 de Novembro de 2010
 Circulação de Registros (CR)
 saúde
 SIBE O NÚMERO DE MORTOS POR SUPERBACTÉRIA NO DF
 Saúde e número de mortes causadas no Distrito Federal
 De acordo com a Secretaria de Saúde do DF, 64 pessoas internadas em hospitais do região são portadoras de bactéria, sendo que 12 apresentam infecção. No país, já foram detectados casos de KPC também em Estados como São Paulo, Minas Gerais, Goiás, Santa Catarina, Espírito Santo, Paraná e Paraíba.
 Bactérias resistentes



BBC Mobile News | Sp
NEWS HEALTH
 Home UK Africa Asia-Pac Europe Latin America Mid-East South Asia US
 11 August 2010 Last updated at 13:14 GMT
New 'superbug' found in UK hospo
 By Michelle Roberts
 Health reporter, BBC News
 20/10/2010 13h24 - Atualizado em 20/10/2010 21h34
Estados se mobilizam para enfrentar superbactéria em hospitais
 Secretaria da Saúde de MG enviou comunicado alertando para problema. Dois relatórios do governo do DF apontam falhas básicas de controle.
 By RON NAMFI, PHD





Conventional wastewater treatment ⇒ low removal of antibiotics and no disinfection

Advanced processes (Ozone based processes, membrane technology)
⇒ High costs with energy and chemicals

Decentralized and cost-effective inovative treatment technologies

Reduction in transportation and treatment costs

Overview of the IDOUM Project

Establish priority list of contaminants and pathogens

Hybrid systems for wastewater treatment

Biology-based systems

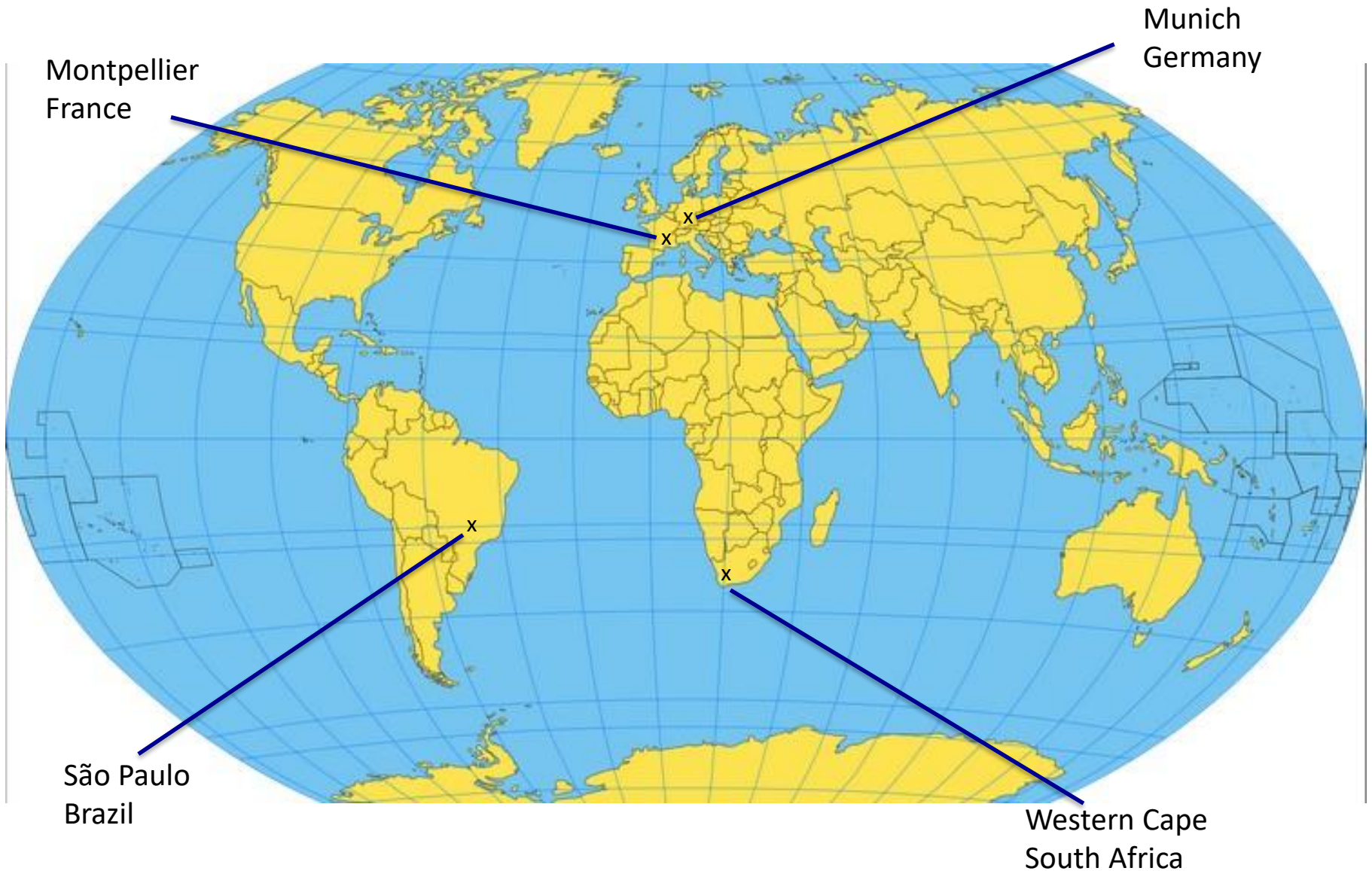
Nanostructured catalytic materials

- Bioaugmented microorganisms
Constructed Wetlands
Phytoremediation with endophytic bacteria inoculation
- Phycoremediation with specific algae species
- Mycoremediation with specific *Trichoderma sp.*

- Heterogeneous Fenton process (Persulfate or hydrogen peroxide as oxidants)
- Nanostructured iron and copper oxides as catalysts
- Filtration through CuO-clay composites
- Iron mining residues
- Clay or zeolite supports for catalysts

Technology Integration

Geographic location of IDOUM partners



Overview of the IDOUM Consortium

	Institution	Country	Expertise
Coordination Serge Chiron	University of Montpellier	France	<ul style="list-style-type: none"> Analytical Chemistry Advanced Oxidation Processes Nanomaterials Decentralized wastewater treatment
Peter Shröder	Helmholtz Zentrum München - German Research Center for Environmental Health	Germany	<ul style="list-style-type: none"> Metabolism of xenobiotics by plants Constructed wetlands
Paul Johan Oberholster/ Bettina Genthe	Council for Scientific and Industrial Research (CSIR)	South Africa	<ul style="list-style-type: none"> Risk assessment Microbiology Phycoremediation based wastewater treatment
Raquel F. Pupo Nogueira	São Paulo State University Institute of Chemistry	Brazil	<ul style="list-style-type: none"> Advanced Oxidation Processes Nanomaterials Analytical Chemistry

International cooperation

Main Advantages

- Exchange of research experience
- Exchange of new ideas
- Improved cooperation for solution of global challenges
- Integration of complementary expertise
- Broaden scientific knowledge
- Decrease inequalities among different countries

Some Difficulties

- Integration of specific methodologies and techniques
- Standardization of analytical protocols
- Difficulties in long-distance communication
- Financial and environmental impact of traveling

Challenges in elaborating the proposal and implementing the research project

Elaboration

- Find common goals and complementary expertise
- Synchronize the editing of the proposal
- Budget restrictions

Implementation

- Delay in proposal evaluation by National Funding Agency
- Delay in implementation (consortium agreement signature)

Acknowledgements



São Paulo State Research Foundation



A dramatic sunset sky with orange and yellow clouds, and silhouettes of utility poles and trees in the foreground.

Thank you