

# Conservazione della biodiversità: la rilevanza della componente genetica, 2



**COST Action CA18134**  
**Genomic Biodiversity Knowledge**  
**for Resilient Ecosystems**  
**G-BIKE (2019-2023):**  
**overview**

Corso ONTAM, 11 settembre 2022

**Cristiano Vernesi (Chair)**  
**Forest Ecology Unit, Research and Innovation Centre**  
**Fondazione Edmund Mach (Italy)**



## The challenge:

to help establish the use of genomic data as a standard tool for monitoring and managing wild and *ex-situ* populations of plants and animals.

Implement best practices for maximizing species potential for adaptation, particularly with respect to EU Initiatives including the EU Biodiversity Strategy for 2020, management of Natura 2000 sites and the Habitats Directive





## Main objectives:

- Develop common tools - the bike frame - where genomic science can be practically incorporated to better address ecosystem management and policy priorities
  - Develop shared and agreed protocols for monitoring genetic diversity
- Develop models and protocols to integrate genetic diversity into existing EU biodiversity policy and other transnational instruments
  - Provide information and guidance for the use of novel biotechnological tools
  - Advance the theoretical framework for “genes to ecosystems” thinking
- Disseminate outputs, in scientific publications, policy briefs but also in easy-to-read summaries for practitioners



Chair: *Cristiano Vernesi,*

Vice Chair: *Margarida Lopes-Fernandes (PT)*

WG1 Implementing genetics into management – *Philippine Vergeer (NL)*

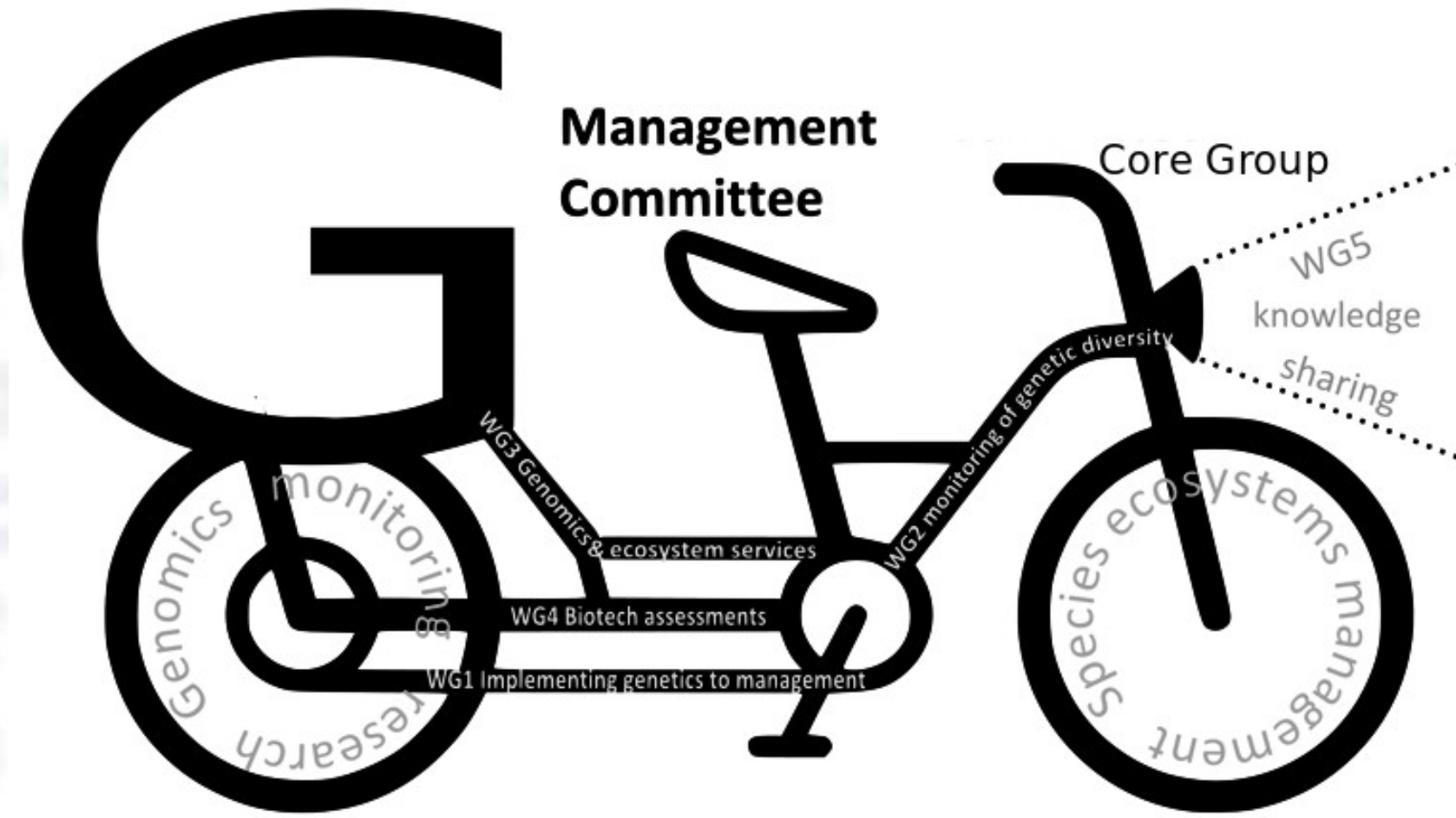
WG2 Monitoring of genetic diversity – *Mike Bruford (UK)*

WG3 Genomics and ecosystem services – *Myriam Heuertz (FR)*

WG4 Biotechnological assessment – *Gernot Segelbacher (GER)*

WG5 Knowledge sharing – *Belma Kalmaujic-Stroil (BHE)*

Main tools funded: Workshops, Training Schools, Short Term Scientific Missions, Virtual Mobility Grants, Conferences



**Scientists**

**Practitioners**

**We, the G-BIKERS**

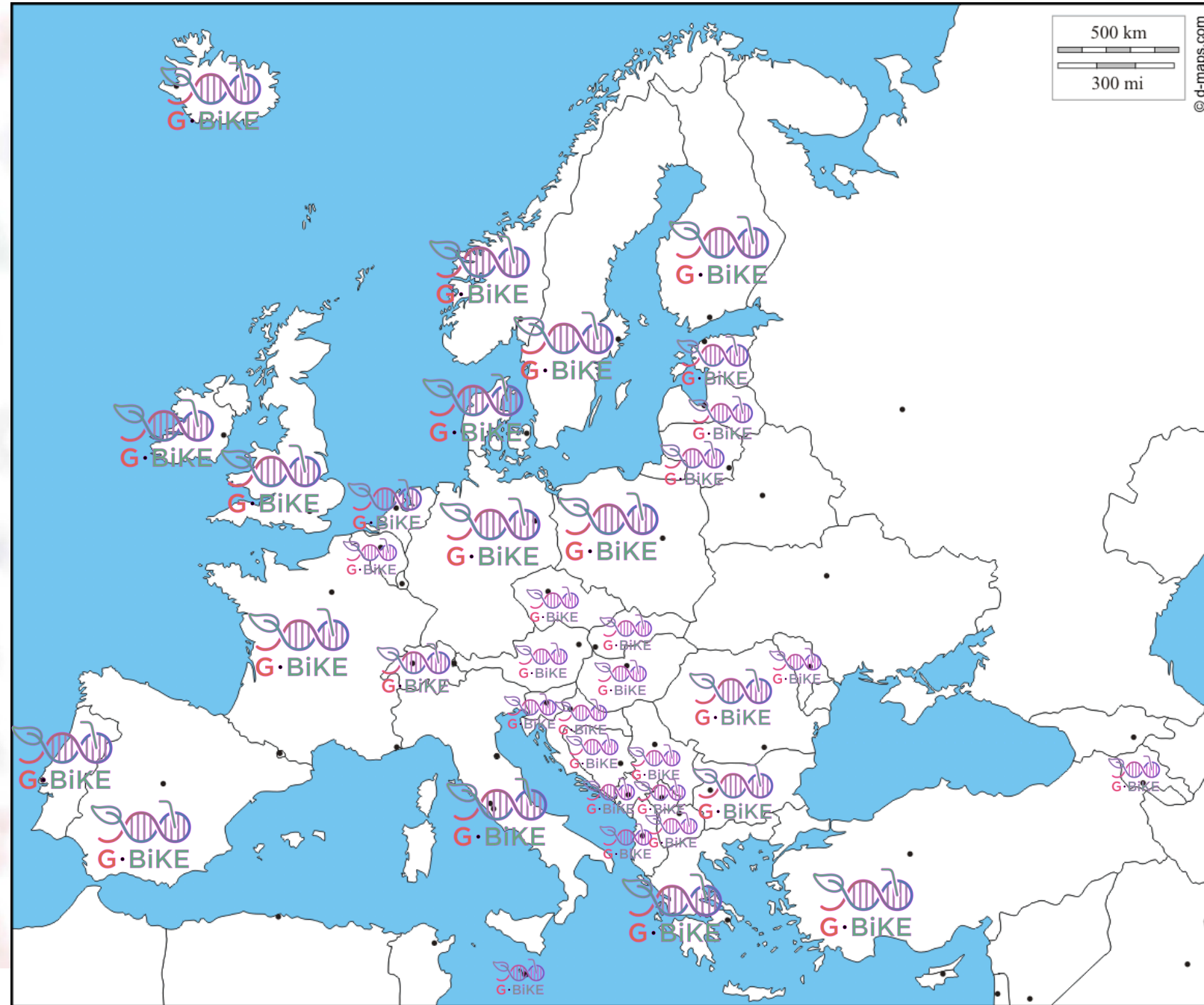


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# The G-BiKE 4 years-tour (2019-2023) 39 EU countries, more than 100 members



**The direction:**  
Firmly establish the role of genomics in managing natural systems and their evolutionary capacity.  
Developing standardized monitoring tools and guides, helping that such standards are implemented in local site management and thus ultimately in **EU wide policy.**



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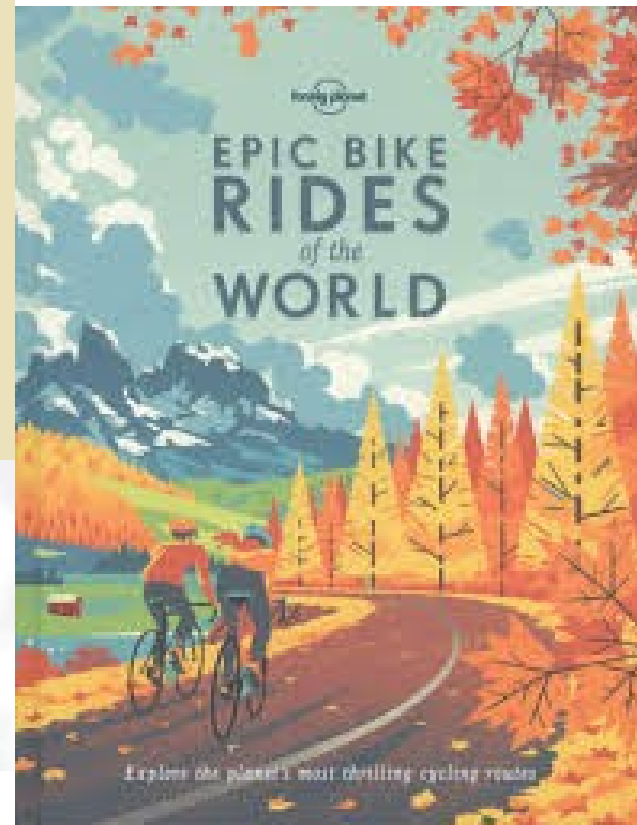
# Strategy

Shall we focus 'just' on Europe, especially now that the Convention of Biological Diversity (CBD) post-2020 Global Biodiversity Framework is taking shape ?

To effectively engage in the process related to the the CBD post-2020 Global Biodiversity Framework.

**Fifteenth meeting of the Conference of the Parties to the Convention on Biological Diversity**

7 - 19 December 2022 - Montreal, Canada



A screenshot of the 'COP 15: INFORMATION NOTE FOR PARTICIPANTS' website. The page features a dark background with a cityscape image. A navigation menu on the left lists: Topics, Processes and Meetings, Cooperation and Partnerships, Action Agenda, and News and Stories. The main heading reads 'COP 15: INFORMATION NOTE FOR PARTICIPANTS' followed by a sub-heading: 'From badge issuance, and accommodation to side-events registration, venue, and visa, find all key information for participants to the COP 15'. The Convention on Biological Diversity logo is in the top left, and navigation links for 'BIODIVERSITY CONVENTION', 'CARTAGENA PROTOCOL', 'NAGOYA PROTOCOL', and 'COUNTRIES' are in the top right.

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## Policy analysis

## Genetic diversity targets and indicators in the CBD post-2020 Global Biodiversity Framework must be improved

Sean Hoban<sup>a,\*,1,2</sup>, Michael Bruford<sup>b,1,2</sup>, Josephine D'Urban Jackson<sup>b</sup>, Margarida Lopes-Fernandes<sup>c,1</sup>, Myriam Heuertz<sup>d</sup>, Paul A. Hohenlohe<sup>e</sup>, Ivan Paz-Vinas<sup>\*,2</sup>, Per Sjögren-Gulve<sup>f,1</sup>, Gernot Segelbacher<sup>g,1,2</sup>, Cristiano Vernesi<sup>h,1,2</sup>, Sally Aitken<sup>i</sup>, Laura D. Bertola<sup>h,1,2</sup>, Paulette Bloomer<sup>k</sup>, Martin Breed<sup>l</sup>, Hernando Rodríguez-Correa<sup>m</sup>, W. Chris Funk<sup>n,1,2</sup>, Catherine E. Grueber<sup>o</sup>, Margaret E. Hunter<sup>p,1,2</sup>, Rodolfo Jaffe<sup>q</sup>, Libby Liggins<sup>r</sup>, Joachim Mergeay<sup>s,t,2</sup>, Farideh Moharrek<sup>u,v</sup>, David O'Brien<sup>w</sup>, Rob Ogden<sup>x,1,2</sup>, Clarisse Palma-Silva<sup>y</sup>, Jennifer Pierson<sup>aa,2</sup>, Uma Ramakrishnan<sup>ab</sup>, Murielle Simo-Droissart<sup>ac</sup>, Naoki Tani<sup>ad</sup>, Lisette Waits<sup>ae,1,2</sup>, Linda Laikre<sup>af,1</sup>



## Trends in Ecology &amp; Evolution

Available online 24 January 2022

In Press, Corrected Proof



## Opinion

## Ancient and historical DNA in conservation policy

Evelyn L. Jensen<sup>1,21</sup>, David Díez-del-Molino<sup>2,3,21</sup>, M. Thomas P. Gilbert<sup>4,5</sup>, Laura D. Bertola<sup>6</sup>, Filipa Borges<sup>7,8,9,10</sup>, Vlatka Cubric-Curik<sup>11</sup>, Miguel de Navascués<sup>12,13</sup>, Peter Frandsen<sup>14</sup>, Myriam Heuertz<sup>15</sup>, Christina Hvilsom<sup>14</sup>, Belén Jiménez-Mena<sup>16</sup>, Antti Miettinen<sup>17</sup>, Markus Moest<sup>18</sup>, Patrícia Pečnerová<sup>6</sup>, Ian Barnes<sup>19</sup>, Cristiano Vernesi<sup>20</sup>

## Science

## Post-2020 goals overlook genetic diversity

Linda Laikre, Sean Hoban, Michael W. Bruford, Gernot Segelbacher, Fred W. Allendorf, Gonzalo Gajardo, Antonio González Rodríguez, Philip W. Hedrick, Myriam Heuertz, Paul A. Hohenlohe, Rodolfo Jaffé, Kerstin Johannesson, Libby Liggins, Anna J. MacDonald, Pablo Orozco-Wengel, Thorsten B. H. Reusch, Hernando Rodríguez-Correa, Isa-Rita M. Russo, Niils Ryman and Cristiano Vernesi

Science 367 (6482), 1083-1085.  
DOI: 10.1126/science.abb2748



## Policy analysis

## Genetic diversity is considered important but interpreted narrowly in country reports to the Convention on Biological Diversity: Current actions and indicators are insufficient

Sean Hoban<sup>a,y,1,\*</sup>, Catriona D. Campbell<sup>b,1</sup>, Jessica M. da Silva<sup>c,d,1</sup>, Robert Eklom<sup>e,y,1</sup>, W. Chris Funk<sup>f,y,1</sup>, Brittany A. Garner<sup>g,1</sup>, José A. Godoy<sup>h,1</sup>, Francine Kershaw<sup>i,1</sup>, Anna J. MacDonald<sup>b,j,y,1</sup>, Joachim Mergeay<sup>k,l,y,1</sup>, Melissa Minter<sup>m,1</sup>, David O'Brien<sup>n,1</sup>, Ivan Paz Vinas<sup>o,p,1</sup>, Sarah K. Pearson<sup>q,1</sup>, Silvia Pérez-Espona<sup>r,s,y,1</sup>, Kevin M. Potter<sup>t,1</sup>, Isa-Rita M. Russo<sup>u,y,1</sup>, Gernot Segelbacher<sup>v,y,1</sup>, Cristiano Vernesi<sup>w,y,1</sup>, Margaret E. Hunter<sup>x,y,1</sup>



## Forum

## Global Commitments to Conserving and Monitoring Genetic Diversity Are Now Necessary and Feasible

SEAN HOBAN<sup>\*,1</sup>, MICHAEL W. BRUFORD<sup>2</sup>, W. CHRIS FUNK<sup>3</sup>, PETER GALBUSERA<sup>4</sup>, M. PATRICK GRIFFITH<sup>5</sup>, CATHERINE E. GRUEBER<sup>6</sup>, MYRIAM HEUERTZ<sup>7</sup>, MARGARET E. HUNTER<sup>8</sup>, CHRISTINA HVILSOM<sup>9</sup>, BELMA KALAMUJIC STROIL<sup>10</sup>, FRANCINE KERSHAW<sup>11</sup>, COLIN K. KHOURY<sup>12</sup>, LINDA LAIKRE<sup>13</sup>, MARGARIDA LOPES-FERNANDES<sup>14</sup>, ANNA J. MACDONALD<sup>15</sup>, JOACHIM MERGEAY<sup>16</sup>, MARIAH MEEK<sup>17</sup>, CINNAMON MITTAN<sup>18</sup>, TAREK A. MUKASSABI<sup>19</sup>, DAVID O'BRIEN<sup>20</sup>, ROB OGDEN<sup>21</sup>, CLARISSE PALMA-SILVA<sup>22</sup>, UMA RAMAKRISHNAN<sup>23</sup>, GERNOT SEGELBACHER<sup>24</sup>, ROBYN E. SHAW<sup>25</sup>, PER SJÖGREN-GULVE<sup>26</sup>, NEVENA VELIČKOVIĆ<sup>27</sup>, AND CRISTIANO VERNESI<sup>28</sup>

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# What we propose

## GOAL

**2030** Loss of genetic diversity within all species has been halted and existing genetic diversity is maintained. Strategies to avoid loss in the future have been developed and are initiated.

**2050** Conditions assuring the evolutionary adaptive potential and long-term maintenance of genetic diversity within populations of species have been restored and secured.

## ACTION TARGET

Halt loss, retain, safeguard and restore the genetic diversity and adaptive potential of species and populations, *in situ* and *ex situ*, assuring that by 2030: populations have an effective size above 500, genetic diversity and genetic connectivity is monitored using DNA-based methods in populations of key species, and loss of distinct populations within species has been halted.

## INDICATORS

The number of populations within species with an effective population size ( $N_e$ ) above 500 compared to the number below 500

The proportion of populations maintained within species

The number of species and populations in which genetic diversity is being monitored using DNA-based methods





## CONFERENCE OF THE PARTIES (COP)



### ***Still a steep and long way to go!***

Parties' (clashing) positions:  
an ambitious conservation perspective  
with quantitative binding measures,

VS

a vision more oriented  
to the sustainable use of biodiversity resources.

### ***What's needed?***

Strong EU support to a more precise wording of  
Goal A:

*'Genetic diversity among and within populations of species is safeguarded, 100% of genetically distinct populations are maintained, effective population sizes are large enough to ensure adaptive potential, appropriate genetic exchange is ensured, and long-term genetic conservation strategies are developed and implemented'*

A better inclusion of genetic diversity in Goal A has the potential to significantly reduce the distance between conservation and sustainable use.





## Contact



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**Chair**

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