

Protected area connectivity shortfalls and country-level priorities: global and European insights

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The Joint Research Centre (JRC)' s mission

***“ As the science and knowledge service
of the Commission our mission is to support
EU policies with independent evidence
throughout the whole policy cycle ”***



Aichi Target 11 and the ProtConn indicator

Aichi Target 11 of the Convention on Biological Diversity:

- To have by 2020 at least 17% of land covered by well connected systems of protected areas (PAs).
- No specification of any quantitative criteria or indicator to be used.

The **Protected Connected (ProtConn) indicator** by the JRC *:

- Quantifies: Percentage of the land of a country (or ecoregion) covered by protected areas that are connected.
 - Can never be higher than PA coverage.
- Answers: How well designed is a PA system for connectivity?
- Can be used to: track progress towards Aichi Target 11.

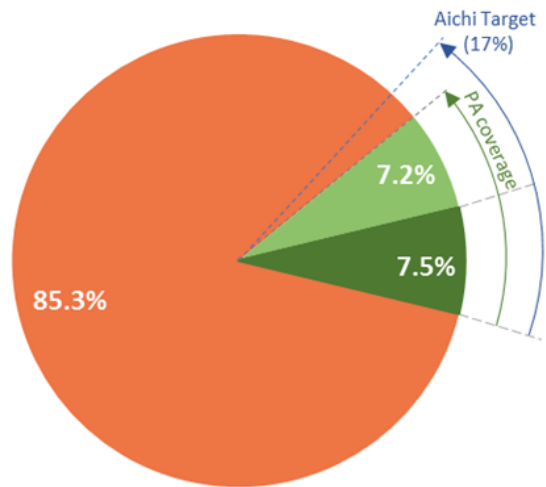
* *Saura et al. (2017 Ecological Indicators, 2018 Biological Conservation)*

The ProtConn indicator: some details

- Based on network analysis (**graph theory**) and the Probability of Connectivity and Equivalent Connected Area metrics in Conefor (www.conefor.org).
- Accounts for **intra-PA and inter-PA connectivity**.
- **Considers** different lands (**unprotected, protected, transboundary**) through which movement between protected locations may occur.
- Focuses on the PA **connectivity** that is **in the power of a country to influence**: factors out PA isolation due to the sea and to foreign lands.
- Accounts for the size, spatial arrangement and coverage of PAs, currently using WDPA of June 2016.
- Does not account for landscape matrix heterogeneity (due to high variability in species responses to land cover): distance-based.
- For different median dispersal distances 1-100 km, but 10 km as the reference.

ProtConn: global average and country results

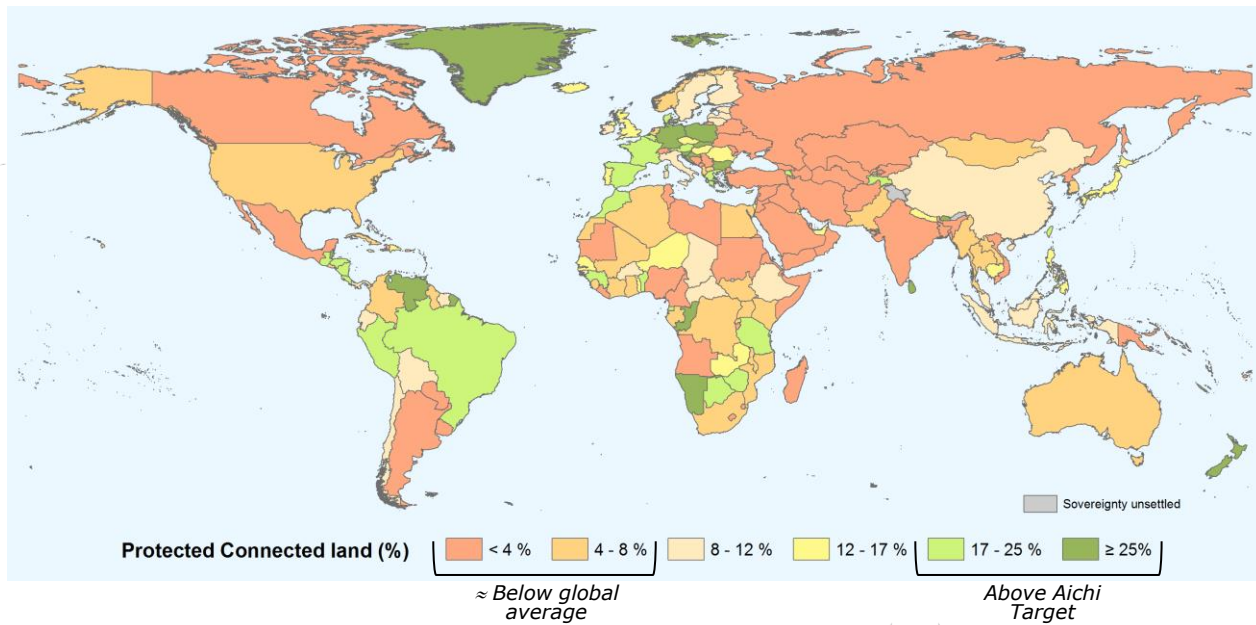
Only \approx half of the protected land is connected



- Unprotected
- Protected not connected
- Protected connected (ProtConn)

Only 30% countries already meet Aichi Target 11 connectivity element as given by ProtConn \geq 17%

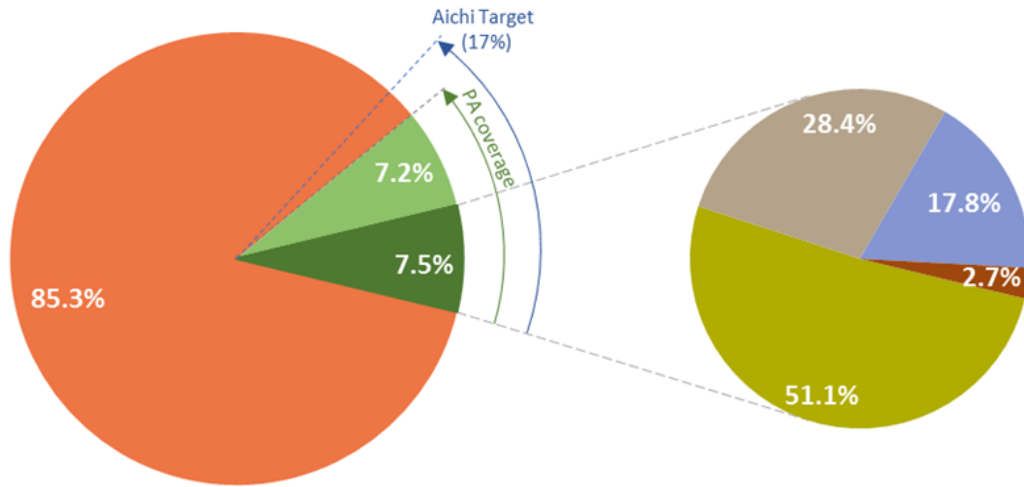
Percentage of the countries covered by protected connected lands (ProtConn)



All results as of June 2016 and for a reference median dispersal distance of 10 km.

ProtConn fractions: additional insights

Only \approx half of the protected land is connected



- Unprotected
- Protected not connected
- Protected connected (ProtConn)

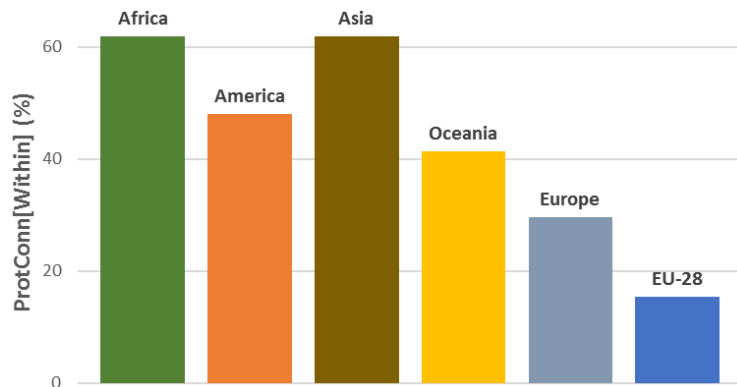
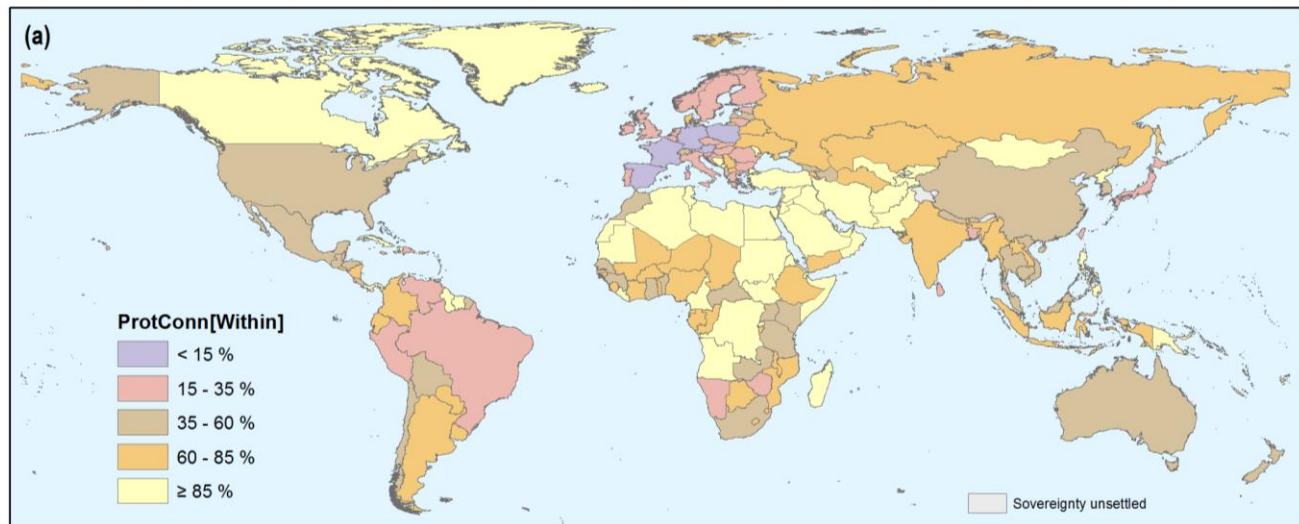
- Unprotected
- Protected not connected
- Protected connected (ProtConn) by moving....
 - ...through protected lands
 - within individual PAs
 - through sets of contiguous PAs
 - ...through unprotected lands
 - ...through transboundary PAs

Small PAs? An effective network of sites is more needed

Percentage of the Protected Connected land **that can be reached by moving only within individual PAs**

as quantified by the ProtConn[Within] fraction of ProtConn.

Results as of June 2016 using a reference median dispersal distance of 10 km.



In Europe, and particularly in the EU, individual PAs may not be able to support species persistence (at least as compared to the situation in other regions or continents): more emphasis is needed on building an effective network of PAs.

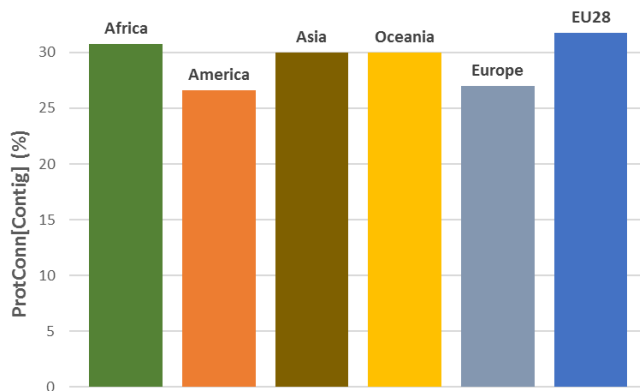
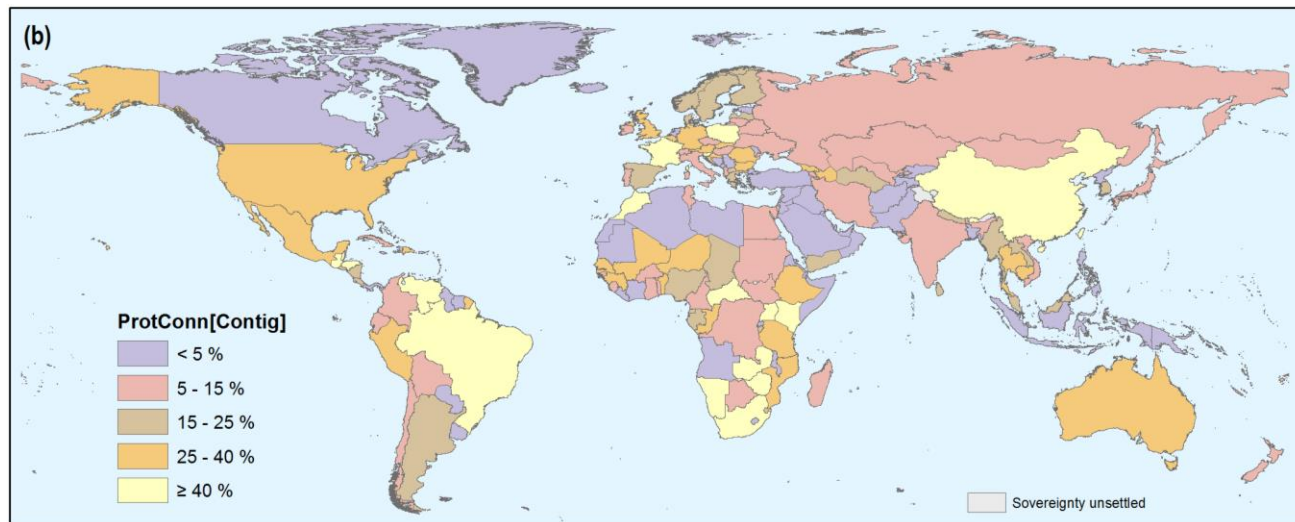
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Coordinated management of adjacent PAs

Percentage of the Protected Connected land **that depends on the possibility of traversing contiguous PAs**

as quantified by the ProtConn[Contig] fraction of ProtConn.

Results as of June 2016 using a reference median dispersal distance of 10 km.



In many countries, movement through protected lands is significantly dependent on traversing adjacent PAs, allowing to reach quite more land than within individual PAs. Need of a coordinated management of adjacent PAs, often with different designations or management plans.

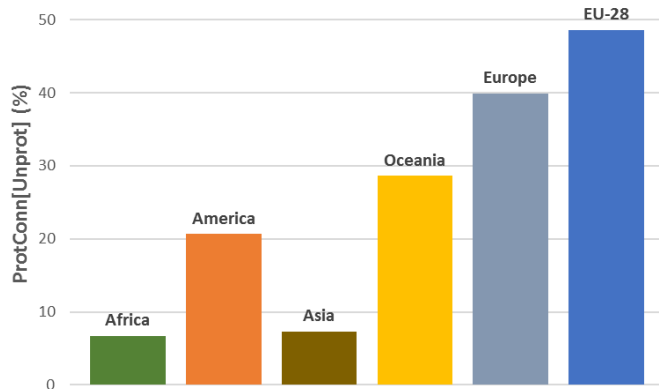
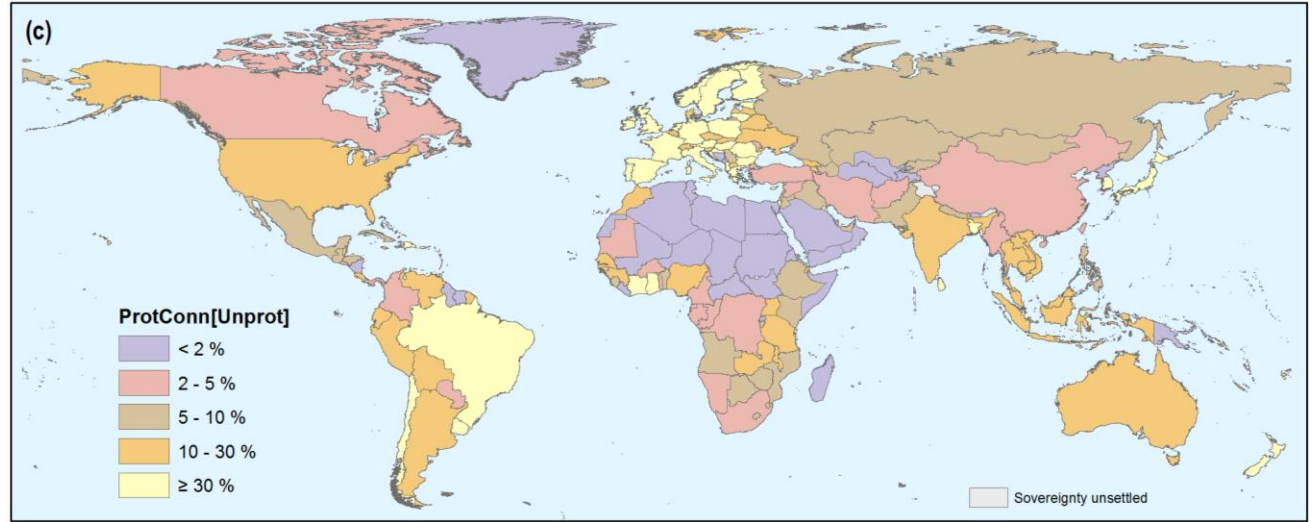
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Ensuring permeability of unprotected lands

Percentage of the Protected Connected land **that depends on movement through unprotected lands**

as quantified by the ProtConn[Unprot] fraction of ProtConn.

Results as of June 2016 using a reference median dispersal distance of 10 km.



In Europe and in the EU, the connectivity of PAs is strongly dependent on the possibility of movement through unprotected landscapes, much more than in any other continent. This highlights the importance of restoring or conserving green infrastructure elements outside PAs.

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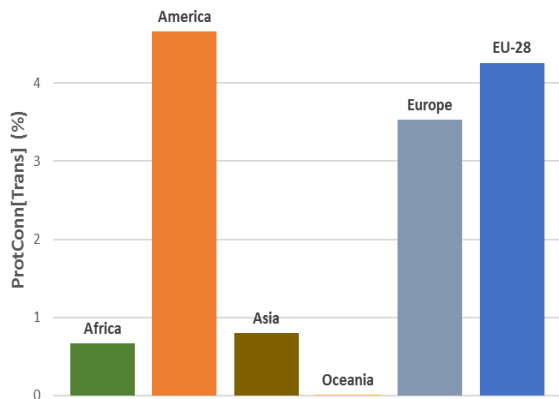
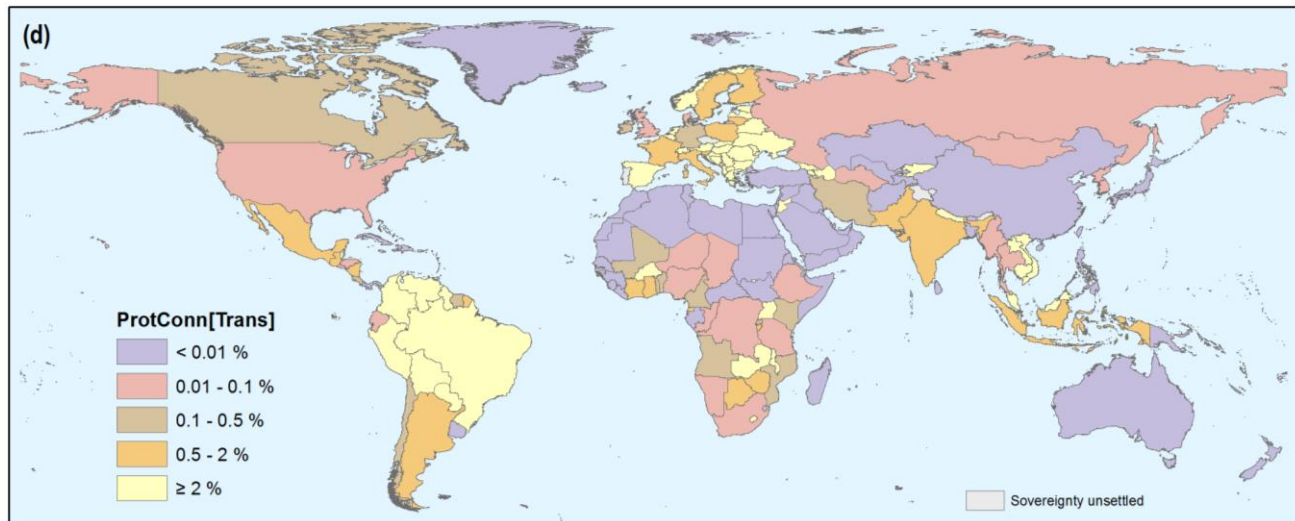
Transboundary PA linkages: coordinated management

Percentage of the Protected Connected land **that depends on transnational linkages**

i.e. on using PAs outside a country when moving between two PAs of the country.

As quantified by the ProtConn[Trans] fraction of ProtConn.

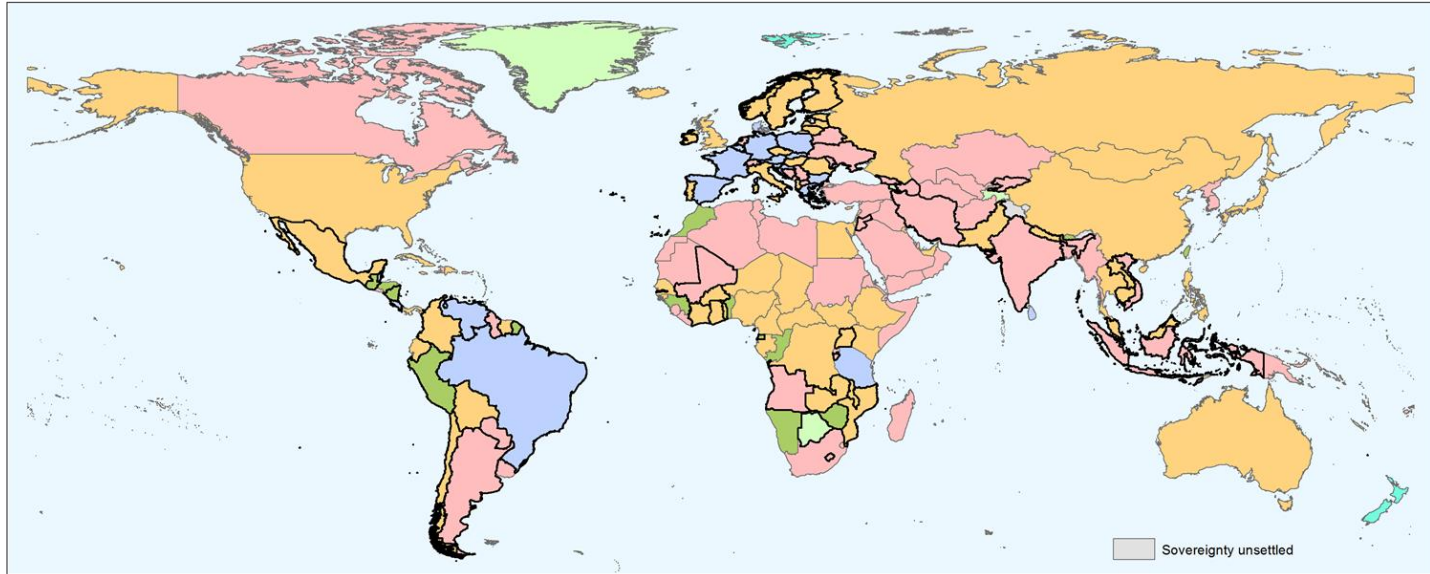
Results as of June 2016 using a reference median dispersal distance of 10 km.



In Europe, in South and Central America, and in parts of Asia, connectivity of PAs within a country depends on transnational linkages to a much larger degree than in any other continent. Need of cross border coordination.

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Main priorities for PA connectivity



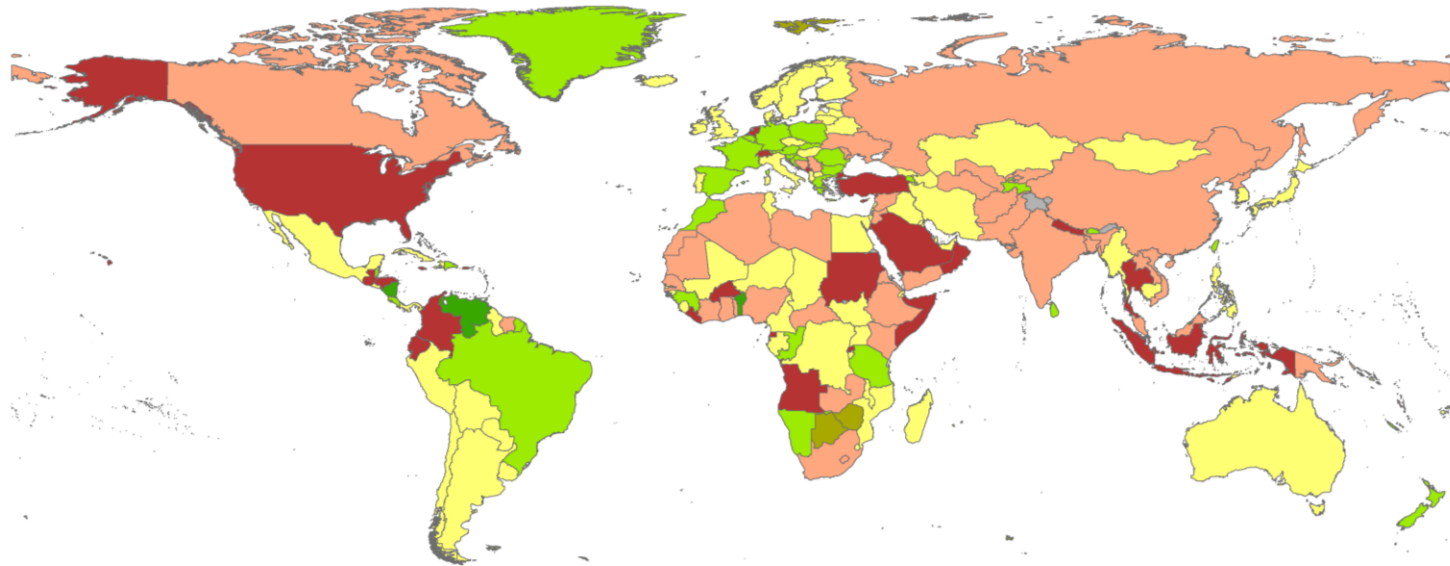
Saura et al. (2018) Biol Conserv 219: 53-67

- | | | |
|--|---|---|
| Below Aichi Target
(ProtConn < 17%) | } | A1. General increase of PA coverage |
| | | A2. Targeted designation of connecting PAs |
| Above Aichi Target
(ProtConn ≥ 17%) | } | B1 + B2. Permeability of unprotected lands (B1) and coordinated management of adjacent PAs (B2) |
| | | B1. Permeability of the unprotected lands in between PAs |
| | | B2. Coordinated management of adjacent PAs in the country |
| | | B3. No specific priority other than PA management effectiveness for connectivity |
| | | C. Coordinated management of transboundary PA linkages |

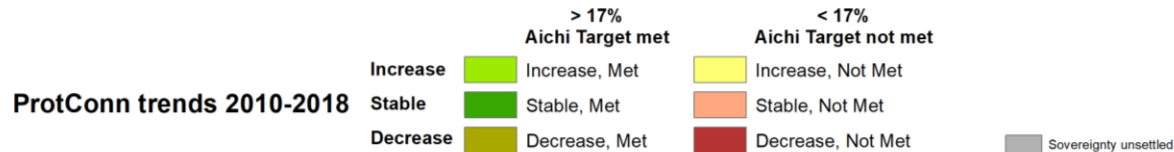
Where are we now?

Results of the ProtConn trends (2010-2018)

ProtConn trends at the country level 2010-2018

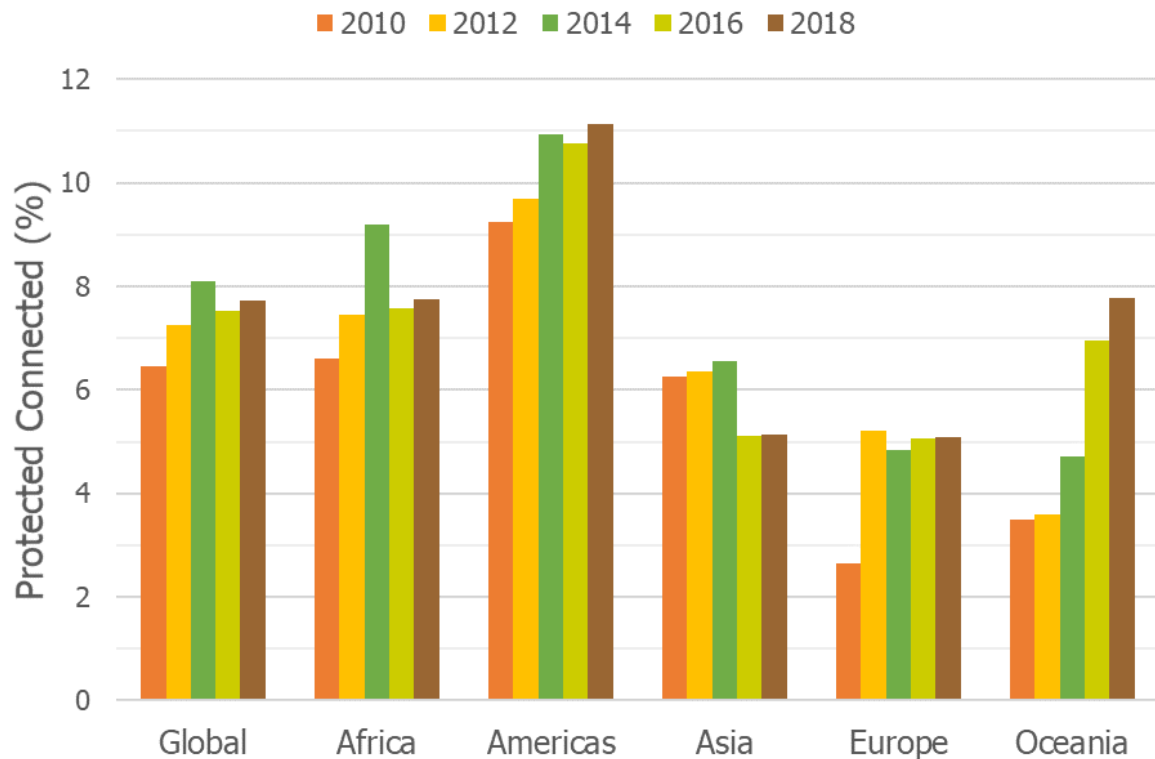


ProtConn value in 2018



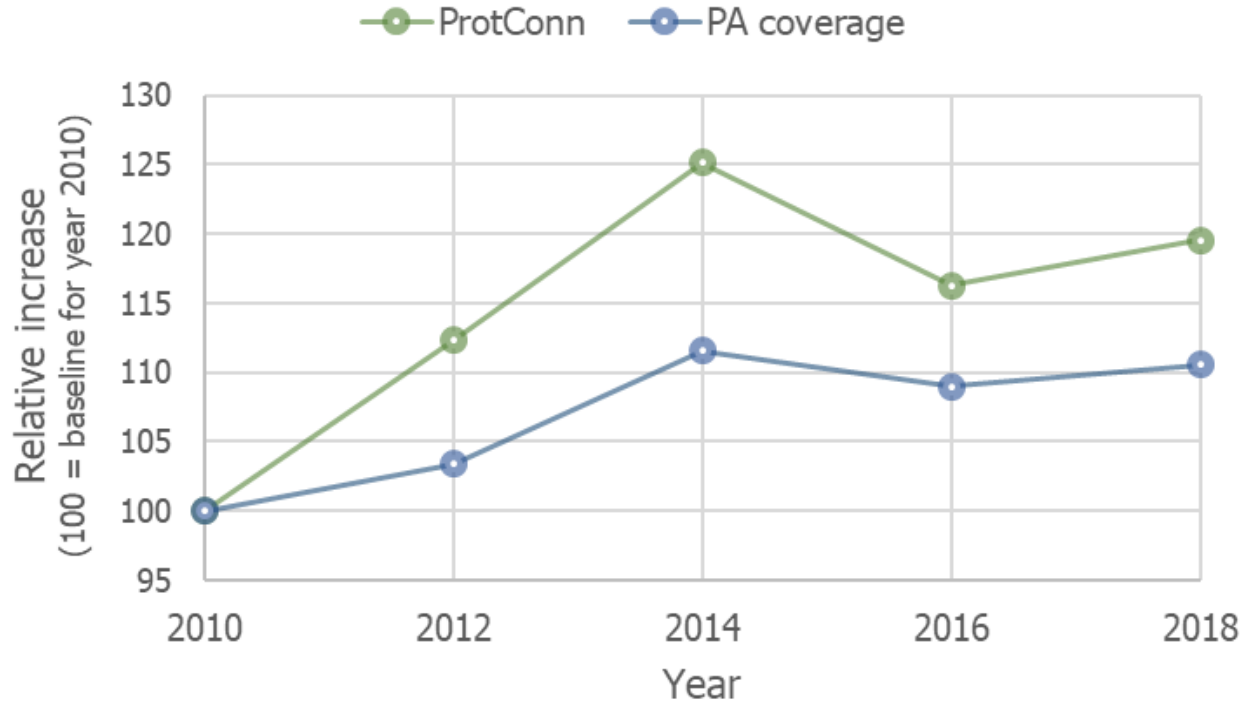
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Global and continental ProtConn trends 2010-2018



Saura, Bertzky, Bastin, Battistella, Mandrici, Dubois, G. 2019. Global trends in protected area connectivity from 2010 to 2018. Submitted.

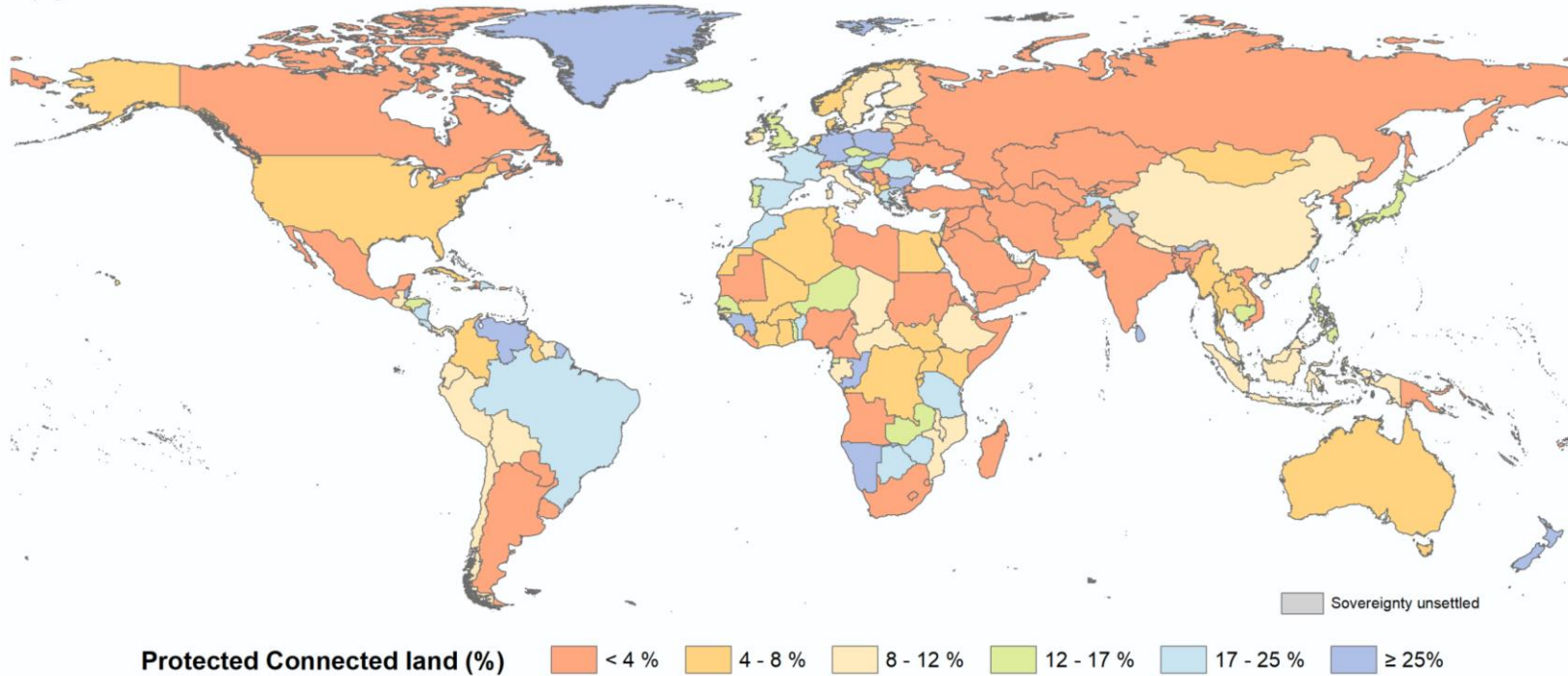
ProtConn has increased faster than PA coverage



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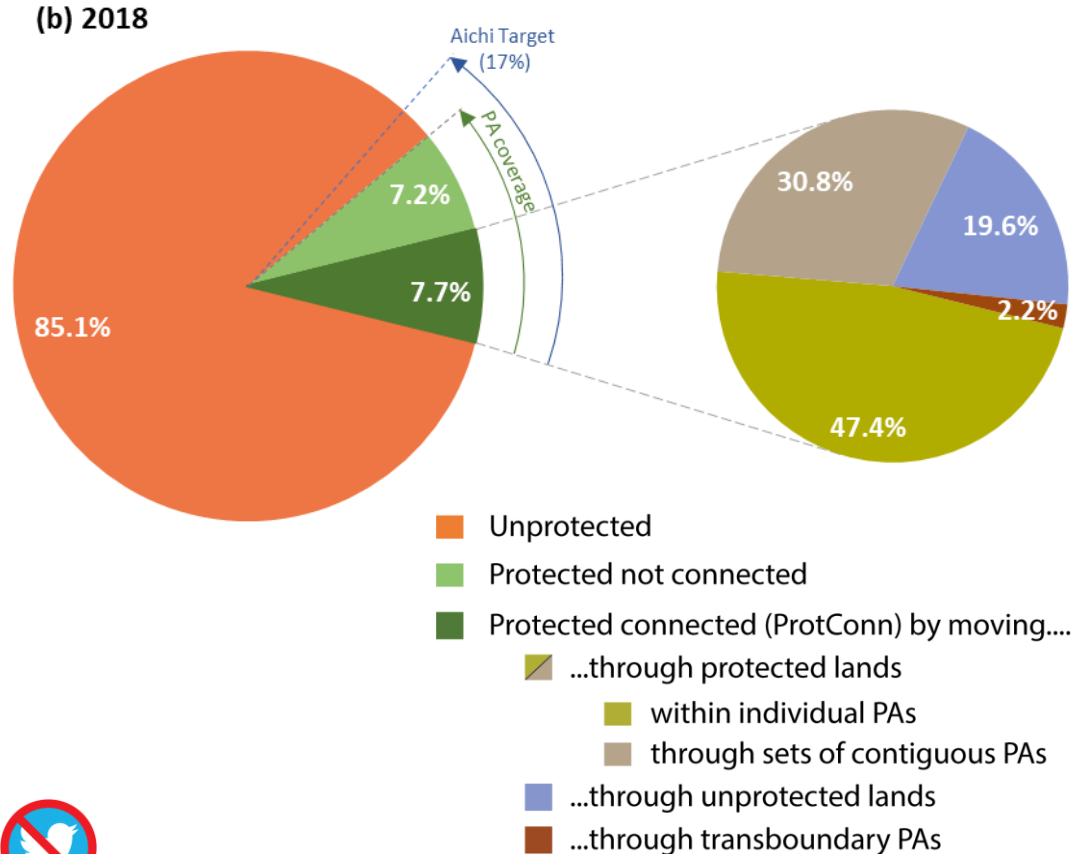
Protected Connected land updated as of 2018

(b) 2018



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ProtConn and its fractions as of 2018 globally



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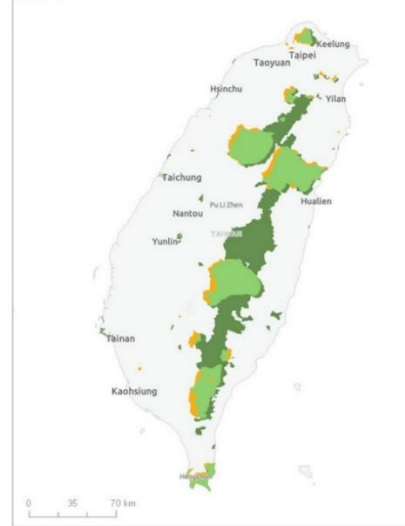


Examples of remarkable ProtConn increases

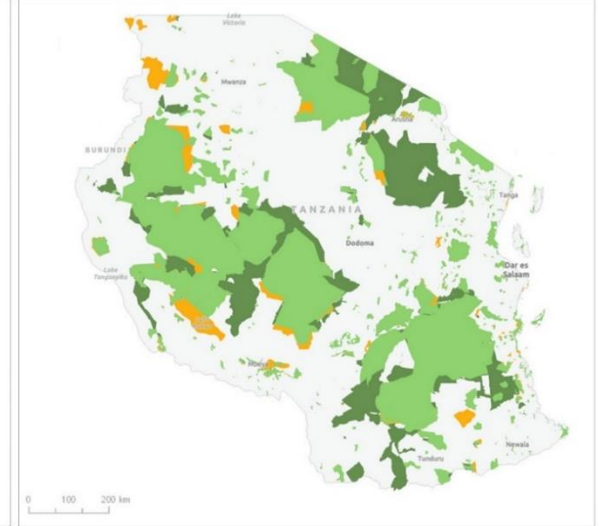
(a) Bhutan



(b) Taiwan



(c) Tanzania



Protected in both
2010 and 2018

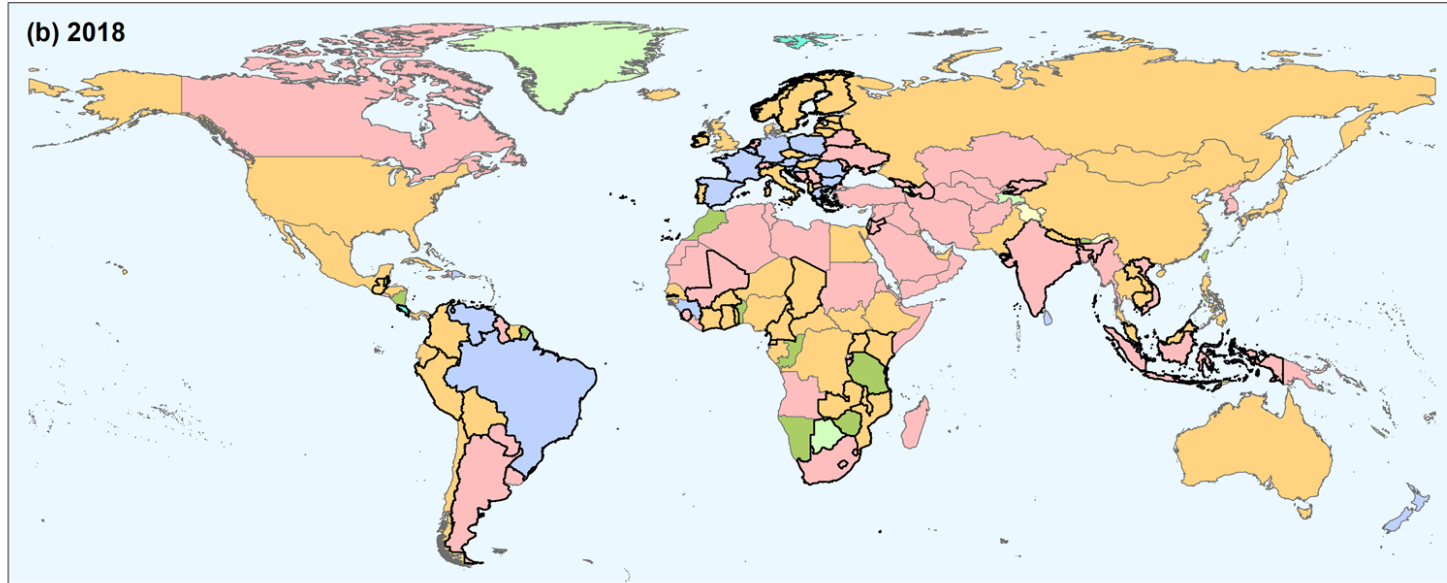
Protection loss
2010-2018

Protection gain
2010-2018



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Country priorities updated as of 2018



Priorities for protected area (PA) connectivity

- A1. General increase of PA coverage
- A2. Targeted designation of connecting PAs
- B1 + B2. Permeability of unprotected lands (B1) and coordinated management of adjacent PAs (B2)
- B1. Permeability of the unprotected lands in between PAs
- B2. Coordinated management of adjacent PAs with different designations in the country
- B3. No specific priority other than PA management effectiveness for connectivity
- C. Coordinated management of transboundary PA linkages

■ Sovereignty unsettled

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In summary, the ProtConn indicator:

- Provides a rich view of the design of PA systems for connectivity.
- Is able to track progress towards connectivity element of Aichi Target 11.
- Highlights strengths and weaknesses of PA systems for connectivity, and a variety of strategic priorities for PA connectivity in the world's countries.
- Has the detailed **results available at the Digital Observatory for Protected Areas (DOPA) of the JRC.**



- Will include further updates or developments planned for 2018-2019.



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