

Introduction

Agriculture is highly vulnerable to climate change, but at the same time, it is a main contributor to climate change. Governments have recognized that facing climate change is essential to address a sustainable development pathway, but so far little progress has been achieved. Thus, there is a need for rapid and transformative actions that tackle climate change impacts while achieving sustainable rural development. Nevertheless, **the way current policies are addressing actions towards transformative actions is unclear concerning sustainable pathways of food systems in the face of climate change.**

In this sense, **this paper reviews current climate change related policies of Latin American countries to identify whether they address transformational actions in agricultural sector or food systems in relation to climate change.** Research questions include which countries state in their policies transformative actions? Are Latin American national policies in line with their international commitments? In order to answer these questions, we used different methods of text analysis applied to policy framework of Latin American countries **to assess the integration level of eight components that Campbell et al. (2018) propose in the theory of change to drive transformation of food systems under climate change.**

Methodology

We developed a mixed method in which we used **quantitative text-mining process**, as well as, **qualitative analyses** of two types of climate change related policy documents in Latin American countries. The policy documents included **Nationally Determined Contributions (NDC)**, and **adaptation and mitigation plans and strategies.**

We analyzed a total of **43 different documents of 17 Latin American countries using text-mining method.** NDC documents of each country were analyzed plus 26 documents related to national adaptation and mitigation plans and strategies. Documents were processed through the Natural Language Processing (NLP) method. This method consists on breaking down the documents into small fragments of words, with the purpose of reaching the semantic root of words and cluster them to identify word frequency, relevant words and their co-occurrence.

We also made a "topic analysis" and an accurate search of words within the texts, in order to find the representativeness of the eight elements proposed by Campbell et al. (2018). The **qualitative analysis focused on a sample of eight countries**, which were chosen in order to address regional representativeness but also diversity among the countries. The purpose of the qualitative analysis was to understand to what extent these countries are addressing Campbell's elements for transformation of food systems under a changing climate.

Figure 1. Word co-occurrence in climate change policies in Latin America

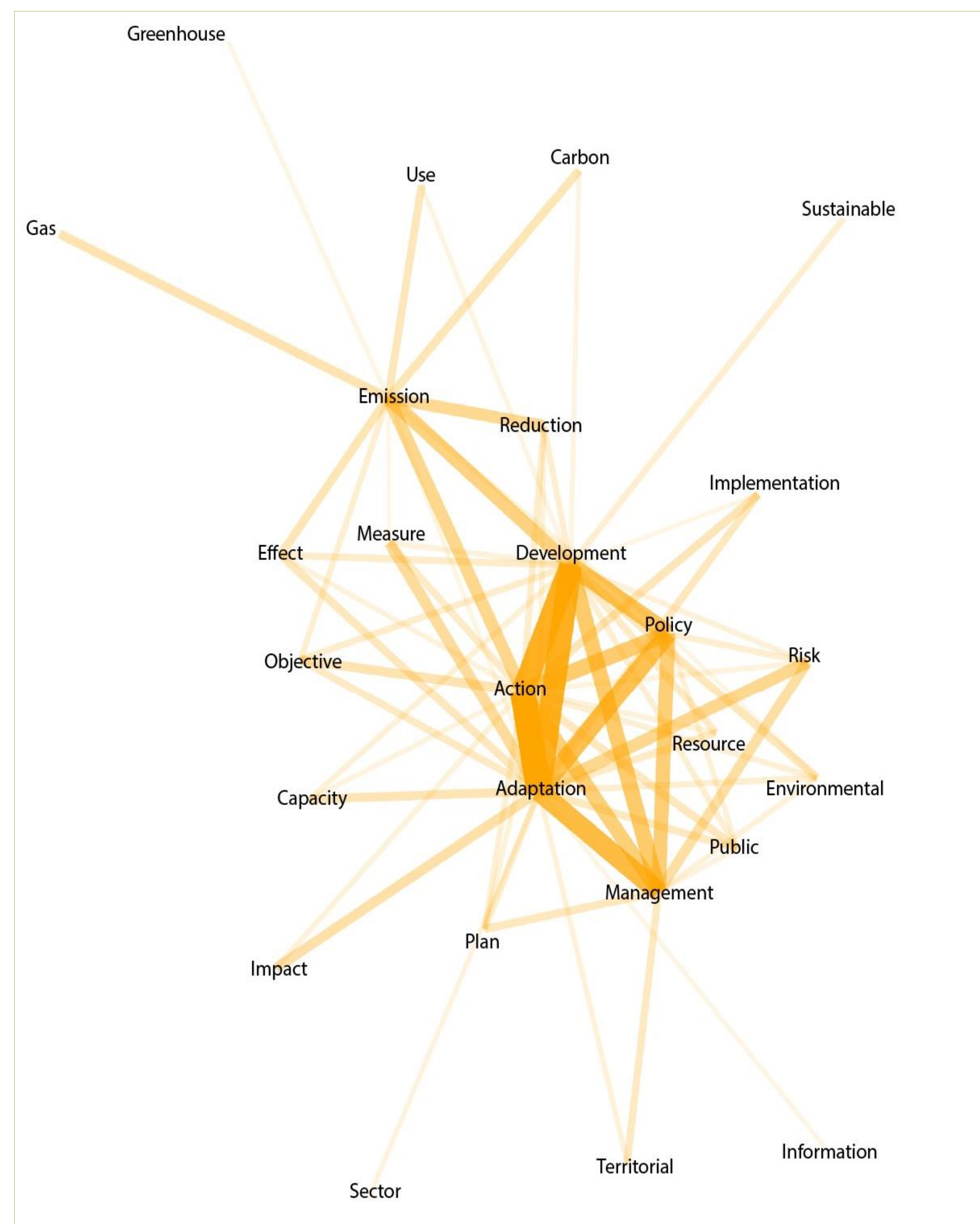
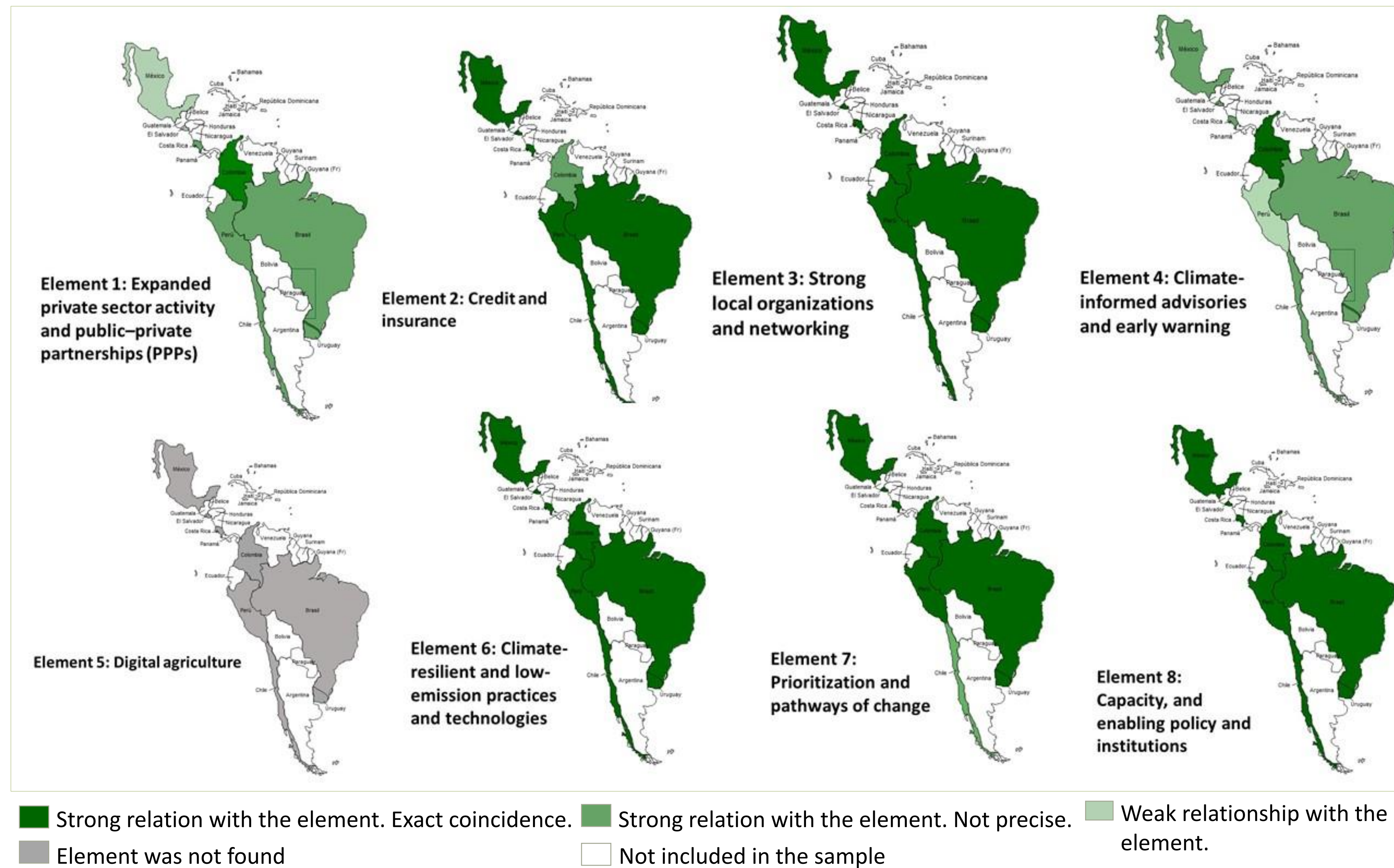


Figure 2. Level of inclusion of Campbell's elements for transformation in policy documents of 8 Latin American countries



Results

- Text-mining analysis of climate change-related policies denotes relevance on topics such as **emissions, adaption, development, action and implementation** (Figure 1).
- The **topic analysis** applied to all national policy documents and NDC **identified two elements related to Campbell's theory of change:** climate-informed advisories and early warning (Element 4) and prioritization and pathways of change (Element 7).
- The **qualitative analysis** showed **strong evidence on the inclusion of five elements (2,3,6,7 y 8)** in all policy documents for all selected countries. These are credit and insurance mechanisms, strengthening organizations, climate resilient and low emissions options, local planning and institutional capacity (Figure 2).
- There is **little evidence on the inclusion of digital agriculture (Element 5)** in Latin American climate change related policies, which suggest the need to promote further action in the region to take advantage of big data and ICT tools to transform regional agricultural sector (Figure 2).
- Although most countries mentioned in their policies that **"climate-informed advisories and early warning" (Element 4) are important**, only Colombia clearly states actions towards its implementation in agriculture trough agroclimatic platforms (Figure 2).
- Regarding Element 1: "expanded private sector activity and public private partnerships (PPPs)", **4 countries clearly promote the PPPs** (Chile, Colombia, Costa Rica and Uruguay), while others give high relevance to private sector participation in climate solutions (Figure 2).

Conclusion

The content of climate change policy documents in Latin American countries seems to be already aligned with the elements of transformation pathways proposed by Campbell et al. (2018), except for "Element 5" on digital agriculture promotion. There are differences in the integration of the elements depending of the type of document, for example, the adaptation and mitigation plans and strategies addressed most of the elements in a more precise and systematic manner than the NDC documents. **Further research is needed to evaluate the implementation of the existing policies in relation to its contribution to a transformation of food systems under a changing climate.**

Key references

- Campbell BM, Hansen J, Rioux J, Stirling CM, Twomlow S, Wollenberg E. 2018. Urgent action to combat climate change and its impacts (SDG 13): transforming agriculture and food systems. Current Opinion in Environmental Sustainability 34:13-20
- Robinson D, Silge J. 2017. Text Mining with R: A Tidy Approach. O'Reilly Media, Inc. ISBN: 9781491981641.