Tourism and inequality in per capita water availability: is the linkage sustainable?

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TOURISM AND INEQUALITY IN PER CAPITA WATER AVAILABILITY: IS THE LINKAGE SUSTAINABLE?

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Abstract

This paper shows the bilateral association between tourism development and inequality in per capita availability of water. The study is conducted on the countries with high tourism receipt, and thereafter, this study shows whether the directions of tourism development in these countries are going to be sustainable, or not. In order to achieve this, we have used tourism investment and tourism receipt as two indicators of tourism development, and have assessed their differential impacts on the disparity in water availability by applying DOLS and causality analysis approach. The results divulge long run impact of tourism on inequality in per capita availability of water, along with the presence of bidirectional causal association among the tourism development and inequality parameters. We show the impact of tourism on the regional disparity in distribution of water that can appear due to the differential approach taken towards tourism development.

Keywords: Inequality in Water Availability, Tourism Development, Theil Index

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Introduction

Tourism is one of the largest global economic sectors, and performance of tourism sector is highly dependent on water resources. However, the shape of worldwide tourism development in the last six decades is causing water stress locally, regionally or internationally (Becken 2014, Distefano and Kelly 2017). There is a strong preference for water-intensive goods and services among tourists as well as changes in the economic structure that requires more water input for tourism establishments and supply chain members (Sun and Hsu 2019). The tourism sector attaches great importance to water resources due to its potential to revitalize and develop tourist destinations (Pueyo-Ros 2018). Under the Sustainable Development Goals (SDGs) paradigm, sustainability of the tourism industry requires efficient and sustainable resource management (LaVanchy 2017, Balsalobre-Lorente et al. 2019). The relationship between water scarcity and tourism has been analyzed since understanding the intrinsic value of this resource. Recently, it has gained more importance due to the water scarcity issues cropping up in the world due to tourism related activities (Ismail 2018, Scott 2018). This issue has led to various studies on the analysis of identifying practices and initiatives for sustainable management of water resources via tourism. Consequently, one of the main lines of tourism research focuses on the relationship between water management and sustainable tourism (Grössling et al. 2015, LaVanchy 2017). Saying this, we would like to reinstate that there is a dearth of literature on the link between tourism development and inequality in water availability. There lies the focus of the study.

Following the works of Cole (2012, 2017), it is evident that tourism growth might cause water scarcity issues, which is a possible consequence of inefficient water management practices. It entails managing the direct and indirect demand of water, arising out of land use patterns and seasonal tourist arrivals. Although tourism growth might result in shift of freshwater from water-

rich to water-scarce regions, it should also be considered that destination tourism increases water consumption in the origin. It can also be observed that tourism campaigns largely focus on aspects of infrastructure and leisure, while awareness about water conservation is given low priority. Now, if the developmental policies of tourism destinations are analyzed, then it can be observed that urban centers are more developed than rural ones. These disproportions in policy level implementations might create disparities in per capita water availability in rural and urban areas. Following this argument, it can be assumed that tourism growth might result in inequality in per capita water availability in rural and urban centers of tourism destinations. On other hand, inequality in per capita water availability in rural and urban centers can have a direct impact on tourism growth. The infrastructural developments in urban centers are aimed at attracting more tourists, and in doing so, water resources shift from water-rich rural areas to water-scarce urban areas. Moreover, lack of awareness campaigns on water preservation among arriving tourists indirectly addresses this reason. Hence, it can be visualized that the policy driven disparities in water availability is one of the major reasons behind growth in tourism. The results obtained by Cole (2012) in case of Canggu village in Bali focused on this particular aspect. Though the study revealed various policy prescriptions regarding rights to access of water, the study was conducted in a context with existing problem of availability of water in rural areas. The similar phenomenon was visible in case of Labuan Bajo in Indonesia (Cole 2017). Due to the contextual limitations, these studies did not show a futuristic aspect regarding the sustainability of tourism in a given context.

Theoretical model

Based on this discussion, it can be said that for assessing sustainable tourism and efficient water management practices, we need to evaluate the association between tourism development

1 and inequality in per capita water availability, with a futuristic approach. By far, the studies by

2 Becken (2013) and Becken and McLennan (2017) have assessed the direct impact of water

3 availability on tourism growth. However, these studies are silent about the impact of disparities

4 in water availability on tourism and vice versa. In this study, we intend to look into this

5 bidirectional association in the context of top 25 tourist destinations, and in this pursuit, we have

6 considered inequality in per capita water availability in rural and urban areas of the sample

7 countries. High number of tourists might result in the faster depletion of natural resources,

8 including water. Therefore, it can be hypothesized that the countries with high level of tourism

9 might experience the inequality in terms of water availability arising out of tourism-related

10 activities (Mishra et al. 2019, Sharif et al. 2020). Owing to this reason, we have restricted our

11 analysis to 25 top tourist destinations of the world. For empirical estimation, this research note

12 looks into the causal association between tourism investment, tourism receipt, and inequality in

13 per capita water availability in these countries. The countries chosen for the analysis are Austria,

14 Canada, China, Croatia, France, Germany, Greece, Hong Kong, Hungary, Italy, Japan, Macao,

15 Malaysia, Mexico, Netherlands, Poland, Russia, Singapore, South Korea, Spain, Thailand,

16 Turkey, Ukraine, the United Kingdom, and the United States (see Appendix 1). We have

17 collected the annual data for per capita capital investment in tourism (INV) in constant US$, per

18 capita tourism receipt (RECPT) in constant US$, and per capita availability of water over the

19 period of 1990-2017. Details of the variables and the descriptive statistics are shown in

20 Appendix 2 and 3. The inequality indices for per capita availability of water for rural areas

21 (INEQR), for urban areas (INEQU), and overall (INEQT) have been calculated by employing

22 Theil Index (Theil 1967)[2]. Movements of these indices are shown in Figure-1.

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[2] This index has been used to calculate inequality by Duro and Padilla (2008), Bhattacharya and Sinha (2016), Sinha and Bhattacharya (2016), Sinha (2016, 2017), Keerthiratne and Tol (2018), and several others.

1   *<Insert Figure 1 here>*

2   Following the scalar approximation of Theil's second measure by Shorrocks (1980), we

3 can define INEQR, INEQU, and INEQT in the following manner:

4 $$INEQR = \lim_{a \to 0} \left[\frac{1}{N_r} \frac{1}{a(a-1)} \sum_1^n \left\{ \left(\frac{w_i}{W_r} \right)^a - 1 \right\} \right] = \frac{1}{N_r} \sum_1^n \left(\frac{W_r}{w_i} \right) \qquad (1)$$

5 $$INEQU = \lim_{a \to 0} \left[\frac{1}{N_u} \frac{1}{a(a-1)} \sum_1^n \left\{ \left(\frac{w_i}{W_u} \right)^a - 1 \right\} \right] = \frac{1}{N_u} \sum_1^n \left(\frac{W_u}{w_i} \right) \qquad (2)$$

6 $$INEQT = \lim_{a \to 0} \left[\frac{1}{N_t} \frac{1}{a(a-1)} \sum_1^n \left\{ \left(\frac{w_i}{W_t} \right)^a - 1 \right\} \right] = \frac{1}{N_t} \sum_1^n \left(\frac{W_t}{w_i} \right) \qquad (3)$$

7 Where, N_r, N_u and N_t denote the total population in the rural areas, urban areas, and in total, W_r,

8 W_u and W_t denote the total availability of water in the rural areas, urban areas, and in total, w_i

9 denote the availability of water in a particular region, a is the approximated scalar. Novelty of

10 this model compared to the other studies is that, while discussing about the water availability

11 issues related to tourism, the empirical interaction with the inequality aspects has been ignored in

12 the literature. Therefore, through bringing forth the issue of inequality in per capita availability

13 of water within a tourism context in an empirical manner by using the Theil index, this study

14 contributes to the literature of tourism economics. Moreover, while analyzing the interaction

15 with the inequality aspects, we have carried out parametric, non-parametric, and instantaneous

16 causality analyses, which gave a robust and conclusive outcome regarding associative interaction

17 among the inequality parameters and the tourism.

18   In the empirical analysis, we have assessed the long run impacts of tourism investment

19 (INV) and tourism receipt (RECPT) on inequality in per capita availability of water through fully

20 modified ordinary least squares (DOLS) method (Kao 1999), while short-run causal associations

21 have been explored by parametric (Dumitrescu and Hurlin 2012), non-parametric (Geweke 1982,

Diks and Panchenko 2006) causality tests. These tests allow the cross-sectional heterogeneity in the panel data.

Analysis of results

The analysis starts with analyzing the applicability of the unit root tests by checking the cross-sectional dependence in the data. By using Chudik and Pesaran (2015) weak cross sectional-dependence test, we found that cross sections are strongly interdependent, and thereby, validating the use of second generation unit root tests. Thereafter, we have employed Pesaran (2003) and Breitung and Das (2008) unit root tests, which divulge that the model parameters are first order integrated, and thereby, allowing us to proceed with further analysis.[3]

The empirical results show that tourism investment, tourism receipt, and inequality indices are cointegrated in the long run, and it is validated by the results of DOLS test reported in Table-1. The empirical results show that 1% growth in tourism investment results in 0.301% positive impact in movement of inequality in per capita availability of water in urban areas, 0.121% negative impact in rural areas, and 0.249% positive impact in overall inequality. On the other hand, 1% growth in tourism receipt results in 0.100% negative impact on inequality in per capita availability of water in urban areas, 0.039% positive impact in rural areas, and 0.088% negative impact on overall inequality. These results bring forth significant insights regarding the sustainable tourism practices in the sample countries. In a scenario characterized by declining inequality in per capita availability of water, tourism investment decreases the inequality in urban areas, whereas it might worsen the situation in rural areas. This finding falls in the similar lines with the finding of Gössling et al. (2012). Our results substantiate the indication provided in this study through demonstrating the way to bridge the demand-supply gap for water through tourism-related investments. On the other hand, tourism receipts decrease inequality in rural

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[3] The results are available on request.

areas, whereas it might worsen the situation in urban areas. Therefore, it can be assumed that tourism receipt is helping people in rural areas to have better access to water, and the existing urban infrastructure is not capable of coping with the growing population pressure. This segment of results falls in line with the findings of Becken (2014). On the flipside, tourism investment is meant for shifting water from rural to urban areas, and therefore, water supply infrastructure in urban areas is improving, at the cost of the access to water in rural areas. Hadjikakou et al. (2013) had talked about this issue in case of the Eastern Mediterranean countries, and our results substantiate their claim even in case of the top 25 tourist destinations.

<Insert Table 1 here>

Results of causality tests in Table 2 and Table 3 demonstrate the presence of bidirectional causal associations between tourism investment, tourism receipt and three inequality indices. The bidirectional causal association between tourism investment and tourism receipt symbolizes that capital investment in tourism results in more tourism income, whereas, the rise in tourism income is attracting more investment in tourism. Now, investments in tourism sector have a causal impact on inequality in per capita availability of water, both at aggregate and disaggregate levels. This segment of our results points towards the stakeholder approach mentioned about Cole (2014). In keeping with this study, our results show that the tourism-related investments can involve multiple stakeholders for reducing the inequality in the availability of water. Similar to this, tourism income is also having a causal impact on inequality in per capita availability of water. These causal associations demonstrate the social outcome of tourism development in these countries, and tourism development policies should encapsulate these dimensions. This segment of the results addresses the policy level gap identified by Tekken and Kropp (2015) by divulging the social dimension of tourism through affecting the inequality in water availability. The capital

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investments in tourism must consider the efficient water management infrastructure, by means of reducing water wastage, wastewater treatment, rainwater harvesting, and safeguarding water sources, so that growth in tourism cannot create the disparities in water availability between rural and urban centers. This claim is substantiated through the performance indicators mentioned by Gössling (2015) for preserving water during the tourism-related activities. These initiatives can help these nations to achieve sustainable tourism objectives by creating ecological sustainability. The findings are graphically represented in Figure 2.

<Insert Table 2 here>

<Insert Table 3 here>

<Insert Figure 2 here>

Conclusions

By far, we have analyzed the causal association between tourism development and inequality in per capita availability of water for top 25 tourist destinations, through a battery of panel causality tests. Tourism development is measured by tourism receipt and tourism investment, and the inequality in per capita availability of water is measured through Theil index. The results show that bidirectional causal associations exist between tourism development and inequality in per capita availability of water.

In view of the findings of the study, this research note has significant policy implications for sustainable tourism. The results show that capital investment in tourism not only causes tourism income, but also causes inequality in per capita availability of water. It signifies the role of tourism not only to generate income, but also to touch upon ecological issues, and thereby, creating the basis for sustainable tourism in these countries. The tourism investment might be directed towards creating tourism infrastructure, which needs to be sustainable from the water

usage perspective, and the inequality in availability of water should not emerge out of the infrastructural development. The income in the form of tourism receipt might be utilized to cater to the unrealized infrastructural demand for fulfilling the demand for water in the rural areas. In this way, the causal associations between the tourism receipt and inequality in per capita availability of water can utilized in a sustainable way.

Further study on this context can be carried out on the context of emerging economies, which are still facing difficulties in ensuring sustainable development.

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