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Interactive comment on "Socio-economic modifications of the Universal Soil Loss Equation" *by* A. Erol et al.

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Anonymous Referee #3 Received and published: 21 July 2015 Manuscript title: Socio-economic modifications of the Universal Soil Loss Equation (Erol et al 2015) 1. I think the "Introduction" section is unnecessarily long and in my opinion, some paragraphs (e.g. from page 1734, line 3 up to page 1735, line 18) can be omitted as they are not closely related to the main objectives of the study. They were omitted as follows. Foley et al. (2011) made a global emphasis on the soil erosion problem that the global population is predicted to reach 9 billion by 2050; in combination with changes in dietary behavior, a large net increase in productivity and/or agricultural area is needed. Additionally, Brevik et al. (2015) argued that soils are thus under increasing environmental pressure, and this will have consequences for the capacity of the soil to continue to

perform its variety of functions. Environmental degradation from human pressures and land use has become a major worldwide problem (Wilson, 1992), however, the effects are felt more in developing countries due to the high population growth rate and the associated rapid depletion of natural resources (Feoli et al., 2002). According to Udo et al. (1990) soils are impoverished and may have also been destroyed by erosion in very densely populated areas. Similarly, on the national level, soil erosion is expected to increase (Nearing et al., 2004; IPCC, 2007). Thus, amelioration measures should be taken in all countries especially at the regional and national level. However, some studies declared that the extent, severity, and consequences of soil degradation remain poorly documented (Bai et al., 2008; Wessels, 2009), there is a vital need for quantitative, repeatable measures of degradation (Brevik et. al., 2015) and/or soil loss. Since biodiversity loss, soil degradation or soil loss and changing in climate are now gradually related to food security, water security, energy security, biodiversity, and many ecosystem services such as food, water and energy security, biodiversity, this critical phenomenon is an international problem. The high rate of erosion under human influences therefore has necessitated the determination of soil loss caused by socio-economic factors and other environmental drivers in order to identify and implement sustainable management practices. The methodology used to combat soil erosion requires an understanding of the mechanisms and consequences of the phenomenon of erosion itself. However, in order to manage erosion at the national level, it is vital to act with a specific and strategic plan in terms of the rational use of natural resources (Erol and Serengil, 2006). In this context, the most efficient approach for minimizing erosion problem is thought to be the use of resources in a timely and organized manner. Haregeweyn et al., (2013) stated that critical erosion hotspots are defined as parts of watersheds with high erosion rates. These hydrological units are also under the influence of human activity including socio-economic factors causes changing the character of the watershed. On the other hand, determining the influential socio-economic "causes" of erosion is just as complex. Furthermore, data to be determined causes of erosion is very scarcely limited. According to MacGillivray (2007), many of the political

and socio-economic factors, however, are regionally effective and intangible. On the other hand, it is important to assess the degree of soil erosion under different environmental and socio-economic situations in order to identify and apply suitable land management interventions (Castro et al., 2001) understand the causes and effects of soil erosion. Therefore, there is a need for more research on the relationship between cause and effect of erosion. Haregeweyn et. al., (2013), however, signified that spatial data to determine soil erosion in the developing countries is often scarce and possibilities to identify source areas for erosion and sediment are very limited. As a matter of fact, Turkey also should be considered to be one of them.

2. Why you did not try to modify the RUSLE, instead of USLE, since it is a better and revised version of the USLE? You have also mentioned on page 1735 (line 28) that the USLE has limited applications. Castro et al., (2001) criticized that the USLE has limited applications. In this study were tried to modify a coefficient in USLE, instead of RUSLE that is a better and revised version of the USLE. The main reason of that, the data from previous studies were obtained from the USLE to the study area. It is obvious that the use of RUSLE would be more perfect to achieve better results when in a similar study designed using actual data.

3. Don't you think that some of the human interferences considered as social factors in this study are already included in the USLE? For example, when a dense forest changed into an open forest by illegal logging, which can be called a human impact, right! And I think this impact and/or factor is already represented in C factor of the USLE. So, why try to find a separate coefficient to represent socioeconomic factors for USLE? Yes, it's right. However, all previous studies had assumed that open forest also includes illegal logging. Therefore, we weren't tried to find a separate coefficient to represent socioeconomic factors for USLE. I know if we had had this C factor represented in USLE, The study could lead to more perfect results. If this study's results accept with these socioeconomic factors can be modified in USLE, my plan to study in the main many watersheds of Lake Region of Turkey would try to an original field study to find

all factors in RUSLE, not USLE. Thus, I think that it could be achieved more reliable data for watersheds. Dear referee, in this case could I change the title of this study? For example, as Socio-economic modifications of the Universal Soil Loss Equation: A study on the determination of a coefficient. Please let me know if I should change the title like that or not. 4. Page 1733, Line 17: please add "for" before "agriculture and forest" in the sentence. I added "for" before "agriculture and forest" in the sentence.

5. Page 1734, line 16: please add "that" before "the extent: : :." in the sentence. This was omitted and added "that" before "the extent. . .But this paraf was omitted as required.

6. Page 1734, line 19-22: please rewrite this sentence as it consists of unnecessary repetitions (e.g. biodiversity, energy, security). This was omitted. . . But this paraf was omitted as required. 7. Page 1735, line 11: please add "and" after "(Castro et al., 2001)" or rewrite this sentence because it is confusing. This was omitted. . . 8. Page 1735, line 18: please rewrite this sentence as it is not clear what it means. "Land degradation and especially soil erosion have long been studied as a physical process in USLE such as geography, geology, agronomy, and engineering (Boardman et al., 2013) in many different scientific fields". This sentence was rewritten in the line. 9. In material and methods section, the 2nd paragraph is a little confusing. I think that if you just mention how much of the two watersheds are covered with vegetation would be enough to see the difference between them. Material and methods section was rewritten in accordance with your comments and the 2nd paragraph was rewritten as follows.

The data of topographic features such as aspect, size of the area, distribution of the land use, aspect, elevation, L were obtained from GIS for two watersheds. The parameters in the USLE such as R, K, C, P factors and Soil Group in two watersheds were obtained from previous studies cited as (DoÄ§an and Güçer, 1976; Arnoldus, 1977; BalcÄś, 1996; Cebel et al., 2013). These two data groups modified with socio-economic factors were used to determine to find a coefficient in the USLE which are

considered to represent the effect of socio-economic factors on soil loss (Figure 2). 10. What do you mean with “All data for this study, such as topographic features, were obtained from GIS”? I think you need to specify what kind of GIS-based maps or layers (e.g. stand maps, DEM, etc.) you have used to gather data. That was corrected and expressed in Figure 2 and 3. . .

11. Page 1741, line 2: the unit for the total amount of erosion should be “414,803 t/yr” (not per ha) since it is for all 630.4 ha. It was corrected in relating to Tables. . . 12. Even though the LS values between these two watersheds were very different, the average erosion amounts per ha for both watersheds were found to be similar. How do you explain this? Yes, LS values for two watersheds were very different, but the average erosion amounts per ha for both them were not similar. However, there were mistakes in the table. Therefore, I corrected all mistakes, and combined and rearranged all tables. 13. As mentioned in the Conclusion section, you might have chosen a watershed with higher percentage of settlement areas in order to see the possible effect of socio-economic factors more easily and clearly. Tables and Figures: Table 1. a. Is the elevation estimated as an average for each watershed? If yes, I would expect that such elevation difference may result in various precipitation amounts. Don’t you think? b. I do not understand why you used “The total ratio of land use (%)” as a feature? Unfortunately, there are no enough meteorological stations in the watersheds of Turkey. For this problem, we found only one measure for precipitation amounts. I will mention this in the text. I will correct “The total ratio of land use (%) and use instead of it “percentage of land use” As I mentioned above if we had planned an original study, we would measure precipitation amount placing stations in each watersheds. I changed elevation word as altitude that is 664 m for WS I and 316 m for WS II.

NOTE: Dear Referee, thanks for your detailed and constructive comments.

Interactive comment on Solid Earth Discuss., 7, 1731, 2015.

Anonymous Referee #3 Received and published: 21 July 2015

Manuscript title: Socio-economic modifications of the Universal Soil Loss Equation (Erol et al 2015)

1. I think the “Introduction” section is unnecessarily long and in my opinion, some paragraphs (e.g. from page 1734, line 3 up to page 1735, line 18) can be omitted as they are not closely related to the main objectives of the study.

They were omitted as follows.

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However, some studies declared that the extent, severity, and consequences of soil degradation remain poorly documented (Bai et al., 2008; Wessels, 2009), there is a vital need for quantitative, repeatable measures of degradation (Brevik et. al., 2015) and/or soil loss. Since biodiversity loss, soil degradation or soil loss and changing in climate are now gradually related to food security, water security, energy security, biodiversity, and many ecosystem services such as food, water and energy security, biodiversity, this critical phenomenon is an international problem. The high rate of erosion under human influences therefore has necessitated the determination of soil loss caused by socio-economic factors and other environmental drivers in order to identify and implement sustainable management practices.

The methodology used to combat soil erosion requires an understanding of the mechanisms and consequences of the phenomenon of erosion itself. However, in order to manage erosion at the national level, it is vital to act with a specific and strategic plan in terms of the rational use of natural resources (Erol and Serengil, 2006). In this context, the most efficient approach for minimizing erosion problem is thought to be the use of resources in a timely and

Fig. 1.