been little discussion about applying cartographical classification ~~method~~methods and export coefficient ~~modeling~~modelling to ~~create~~the creation of land-use management strategies for mitigating pollution ~~potentials~~potential.

The Natural ~~breaks~~Breaks method is one of the most ~~common~~commonly used methods in cartography for the classification or ranging of interval data ~~in cartography.~~. It is based on the subjective recognition of gaps in the distribution, i.e., where there are significantly fewer observations. The Natural ~~breaks~~Breaks method, developed by George Jenks (Jenks, 1967; Luan et al., 2011), ~~minimizes~~minimises variation within classes ~~and maximizes~~while maximising variation between classes. This technique is most useful when the data set has more than one modal value. It also has demonstrated effectiveness: Luan et al. (2011) ~~utilized~~recently utilised the Natural ~~Break~~Breaks classification method to identify break points ~~of~~in the habitat suitability index for wild Amur ~~tiger~~tigers in China~~.~~, and Raikow and D'Amico (2011) applied ~~the classification method~~it to discuss the temporal variation in spatial sources of discharge in a watershed~~, and demonstrated the effectiveness of Natural Break classification.~~.

The case area ~~in~~for this study is the Taipei Water Specific Area (TWSA), an important water source ~~area in~~for northern Taiwan. The land-use activities in this ~~area~~region result in ~~the~~ spatial variability of pollution potential. ~~While~~As resources are limited ~~resource available in protecting source water~~ for the protection of this area, it is important to develop an approach ~~to identify the~~that identifies target subwatersheds ~~of~~that have the highest relative ~~high~~ pollution potential. ~~Therefore, this study~~ Areas with high pollution potential should implement more stringent land-use restrictions than other areas. This study applied the ~~natural breaks classification and~~ export coefficient method ~~to analyze~~, together with the Natural Breaks classification method, to analyse the spatial variability of pollution potential in this area, and used these findings to ~~address~~ examine the efficiency of classified land-use ~~restrictions. Areas with high pollution potential should implement higher land-use restrictions than other areas. This study also addresses several land-use~~ management strategies for reducing pollution potential ~~and assesses the efficiency of each strategy~~.

1. Methods

1.1 Site description

The TWSA ~~comprises~~consists of three basins: Bei-Shih Creek Basin, Nan-Shih Creek Basin, and Sin-Dian Creek Basin, as shown in **Fig. 1**. It covers an area of 697.57 km^2. The Fei-Tsui reservoir, which provides water for around 5 million people in northern Taiwan, is located in Bei-Shih Creek Basin. This study ~~delineated~~divided

the TWSA into 22 subwatersheds based on their drainage ~~area from~~ areas, which were established using the digital elevation model ~~by GIS~~ tool in GIS. Land-use data were obtained from the National Land Surveying and Mapping ~~Center~~Centre, Taiwan (Taiwan NLSC, 2011) and imported into the subwatershed map of the study area. The ~~Center~~Centre conducted ~~the~~a nationwide land~~-~~-use investigation during 2006-2008 ~~based on non-~~using cloud-free aerial photographs and SPOT-5 satellite images. Table 1 lists the ~~area~~areas and ~~area~~ percentage areas of different land~~-uses~~use types in the TWSA. More than 90% of the land ~~in this area~~ is ~~forest~~forested. The ~~percentages~~percentage of forest in Bei-Shih Creek Basin and Nan-Shih Creek Basin ~~are larger~~is higher than that in Sin-Dian Creek Basin~~. Contrarily~~; in contrast, the percentage of built-up area in Sin-Dian Creek Basin is ~~larger~~higher than ~~those~~either in Bei-Shih Creek Basin and Nan-Shih Creek Basin. ~~Besides, the~~The area of ~~farmlands~~farmland in Sin-Dian Creek ~~basin~~Basin is ~~higher~~larger than in the other two basins. Bei-Shih Creek Basin has ~~higher~~the largest area of non-irrigated ~~farmlands /~~farmland without vegetative cover ~~rate than~~of the ~~others~~three.

<Table 1>

1.2 ~~Pollution~~Assessment of pollution potential ~~assessment~~

This study applied the export coefficient method, a popular method for assessing non-point source pollution exports (Griffin *et al.*, 1980; Pegram and Bath, 1995; Taebi and Droste, 2004), to ~~analyze~~analyse the pollution potential in the 22 subwatersheds. Several studies have reviewed published export coefficient data ~~of~~for various land-use types (Lin, 2004; USEPA, 2002). Due to the specific climatic and physiographic characteristics of individual watersheds, agricultural and urban land-uses can exhibit a wide range of variability in nutrient and sediment export. Site-specific ~~numbers~~data are used ~~by preference~~preferentially, if they are available. The export coefficient values used in ~~reservoir watershed in Taiwan~~this study (Table 2) were obtained from ~~a~~ previous ~~study for this~~ research of reservoir watersheds in Taiwan (Wen et al., 2001).

To calculate the pollution load, the following formula was used:

$$P = \sum_{i=1}^{n} A_i E_i$$

where P is the ~~is the~~ nutrient load (kg/yr); A_i is the area of land-use class ~~l~~*i* (ha); and E_i is the export coefficient for land-use class ~~l~~*i* (kg/ha/yr). GIS software (ArcInfo 9.3) was used in this study to process the database and map layers.

註解 [Editor2]:

CHECK: An introduction to the formula used helps clarity. Please check if my insertion reflects your methodology.

註解 [Editor3]:

CHECK: Please confirm that you mean "land-use class *i*" here; there is no 'l' in the formula.