

Research Article

# Raising Social Awareness for Disaster Preparedness and Learning Its Sustainability Through the Production and Sale of Earth Sciences-Based Products and Their Contribution to the Economy

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## Abstract

*The present study aimed to prepare various tables in line with sustainability goals in disaster preparedness and social awareness and present recommendations for different product varieties, product design characteristics, and promotion and sale of these products on the basis of earth sciences. Disaster type diversity, target groups, and Türkiye's regional differences were taken into account when preparing tables. The geological, geographical, meteorological, topographical, urbanization and settlement type characteristics and diversity of seven regions of Türkiye's geography were emphasized. The importance of product development and sales according to the target group and regional characteristics was expressed with the diversity of disaster types and all characteristics of the regions. The possibility for society to access scientific knowledge through simpler, faster, and more sustainable forms of education and learning, through product production and sales, was presented as an approach in disaster preparedness. It was also thought that it could be internationally accepted in this way, guide international studies, and provide support to internationally recognized NGOs and foundations as a social project. Furthermore, it was estimated that contributions could be made to the country's economy, promotion, tourism, and employment. Therefore, the recommendations in this article can significantly benefit society in terms of both sustainability and contributions.*

**Keywords:** Earth sciences, Types of disasters, Social awareness, Product and sales, Sustainability

## 1. Introduction

Türkiye is a country with a wide range of different characteristics, geological in its basis and geographical, geomorphological, topographical, and meteorological on its surface,

and it also involves different urbanization and settlement forms. It has very different forms of urbanization, e.g., coastal cities such as Istanbul, Bursa, Izmir, Tekirdağ, Adana, Antalya, Hatay, and Trabzon, plain cities such as Konya, Afyonkarahisar, Şanlıurfa, Kayseri, Erzurum, Muş, and Iğdır, cities where there is settlement with mountains parallel to the coast such as Zonguldak, Rize, and Artvin, lake shore cities such as Van, and high-altitude (mountainous) cities such as Bayburt, Bitlis, and Hakkari. Moreover, the fact that settlements consist of smaller/larger cities, villages, towns, neighborhoods, and similar settlements on the shores of water resources such as seas, streams, rivers, brooks, and lakes and that there are many similar small/large settlements in more continental areas or areas on the sides/slopes of mountains, hills, plains (settled, partially semi-nomadic, and seasonal settlements) are significant indicators of the diversity of settlements in Türkiye. In these settlements, where the population rates are quite different and variable, preparing for a disaster necessitates more attention in Türkiye. In other words, since various types of disasters can occur in Türkiye, many specific situations should be taken into account. Contrary to the widely adopted opinion in society, it is observed that earthquakes are not the most common type of disaster in Türkiye. Therefore, natural disasters such as floods, landslides, rock falls, earthquakes, avalanches, and meteorological events rank first, and disasters caused by artificial (industrial accidents, chemical/radioactive leakage) or other human-induced (anthropogenic) accidents or events (mine accidents, oil leaks, fires, etc.) are also common throughout Türkiye, especially in places where industrialization and risky production facilities are located or in resource areas [1, 2]. On the other hand, pollution disasters also draw attention nowadays. In this respect, it is thought that it is important to take into account the current situation in the country concerning this issue to consider pollution as a type of disaster.

The fact that Türkiye has rich disaster diversity and many disaster types also attracts the whole world's attention at times. The fact that Türkiye is a country with a high disaster potential also creates a potential for international joint research and development and scientific studies (such as earthquake studies, studies of geological and other scientific disciplines, R&D studies, sustainability, and product variety studies) [3]. Furthermore, it is also important that Türkiye is geopolitically and prominently on the world agenda in terms of disasters [2, 3, 4]. Hence, all these reasons indicate that the products to be produced for educational purposes within the framework of disaster preparedness in our country will contribute to social awareness, whereas an important commercial or economic return will also be obtained. As mentioned in the title of the article, the designs of the products to be developed can have not only quality but also

artistic qualities or can be diversified in compliance with the child-young-adult categories and as popular products. Thus, they can be sold internationally, without being limited to Türkiye, and can also be transformed into products that can contribute to the tourism sector. Due to the proliferation/development of digital world environment conditions, artificial intelligence opportunities and increasing diversity in communication types, products can also be created in these areas. To this end, some products can also be planned and produced in the category of products with collection value according to their design and material quality. Creating another target group by making such special productions, with products carrying a collection value, can add even more value to these studies. Thus, they can be produced in different categories and transformed into products that can be sold domestically and internationally. As long as improvements and developments are ensured, there will surely be other better results owing to disaster preparedness products. While the loss of life and property caused by various types of disasters, which are considered as negativities, in Türkiye and the losses in the country's economy decrease owing to social awareness, it can also contribute to the country's economy. It can also assume a guiding role for other countries with high disaster risk. Therefore, it is believed and aimed that the present article will be a useful study, creating infrastructure on these issues, forming a basis for the development of this scope, and providing ideas for guiding and initiating new projects.

## 2. Materials and Methods

According to the regulation numbered 31200 published in the Official Gazette of the Ministry, disaster is defined as "natural, technological, or human-induced events that lead to physical, economic, and social losses for the whole or certain segments of society and stop or interrupt normal life and human activities" in Article 4 and subparagraph d [5]. However, to make a different, more explicit, and broader definition, if a disaster (event) takes place after events with major and significant effects, regardless of the source, by resulting in losses such as damage, destruction, fire, explosion, etc., and these events substantially affect urbanization structures (roads, pipelines, infrastructure-superstructure distribution connections, dams, canals, mine waste pools, power plants, facilities, refineries, residences, airports, ports, storage areas, workplaces, factories, schools, hospitals, etc.) and human, animal, plant life, and living spaces in urban areas and cause material and spiritual losses, the consequences of these events are called disasters (event). Accordingly, they can be divided into three groups according to the source of the disaster or disasters:

- Natural events (disasters): Earthquake, landslide, tsunami, volcanism, flood, storm, rockfall, liquefaction, tornado, avalanche, karst structures (doline, depression areas, etc.), etc.,
- Artificially induced-anthropogenic (human-induced) events (disasters). Oil/radioactive/chemical leaks, power plant/port/shipyard/hazardous materials facility damages/explosions/fires, chemical fires, forest fires, etc.,
- Secondary events (disasters), in other words, pollution disasters may take place after the above-mentioned events (disasters) (building-household-industrial wastes, air-water-soil pollution, odor-noise-visual pollution, ecosystem damages, agricultural area/product losses, significant cultural area/social structure losses, etc.) [1].

Therefore, in this section, first, disasters will be classified, and ideas for product production and diversity will be presented regarding how to improve learning skills for preparedness for these types of disasters and social awareness. To this end, suggestions will be made to prepare for disasters by ensuring that social awareness is more educational and entertaining with the products to be produced. In this respect, disaster classifications will be made across the country with a holistic (integrated) approach, regionally at the subsequent stage, and presented in tables. As is known, Türkiye is defined by a geography with seven different characteristics, in other words, it consists of seven geographical regions. Therefore, the classification within the scope of differences in these regions will be presented with the following headings together with the sub-classifications (Table 1).

#### **A. Primary disasters**

1. Natural disasters
2. Artificial-anthropogenic (human-induced) disasters

#### **B. Secondary disasters**

1. Pollution disaster

In this regard, suggestions will be made for disaster preparedness in social awareness, on the basis of the variety and types of disasters according to regions. Thus, it is thought that effectiveness in disaster preparedness studies and social awareness and sustainability can be enhanced by planning entertaining, faster, and easily accessible regulations for all segments of society. Accordingly, first, the most effective disasters in Türkiye are classified in Table 1, within the scope of primary disasters and secondary disasters-environment relationships (Figure 1). As seen in Table 1, the relationship between the source that will cause the disaster and the type of disaster is ranked separately according to primary and secondary disasters, and the importance of drawing attention to the types and sources of the disaster of priority is emphasized (Figure 1). In this table, the likelihood

of the most common types of disasters in Türkiye to occur within a year is considered, and disasters are presented in a ranking according to the most frequently recurring disaster type for each resource group. One of the reasons for this is that it is assumed as important to ensure the dissemination of this information in society by presenting the riskiest and frequently recurring disasters during the year and draw attention to relevant preparations. This situation may also increase the interest in accessing information and yield beneficial results by creating an incentive effect on society to gain the habit of learning and using scientific knowledge.

*Table 1: The most effective types of natural and artificial or human-induced (anthropogenic) disasters in Türkiye*

Resource	Type of Disaster
<b>Primary natural disasters</b>	Floods
	Landslides
	Rockfall
	Earthquake
	Avalanche
	Meteorological events (storms, tornadoes, hail, etc.)
<b>Primary disasters of artificial-anthropogenic origin</b>	Risky plant and mining accidents
	Chemical explosions and fires
	Chemical leakage
	Forest fires
	Environmental pollution (types such as air, water, soil, visual, noise, odor pollution (flue gases, decay, burning/fire and other odors of chemical origin))
<b>Secondary disasters as pollution disasters</b>	Pollution disasters, depending on the type of pollution, that occur after natural and artificial disasters, construction debris, asbestos, air-water-soil pollution, and secondary disasters such as infiltration, contamination, spread, leakage, transformation, transportation, flow, solution and burning may occur in the case of domestic and industrial structural damages due to various transformation and transportation/relocation processes. In these cases, they may also cause secondary pollution disasters caused by organic and inorganic products and pollutants through the contamination of bodies with new pollutants in the environments where solid-liquid-gas pollutants reach, resulting in new reactions with these substances.

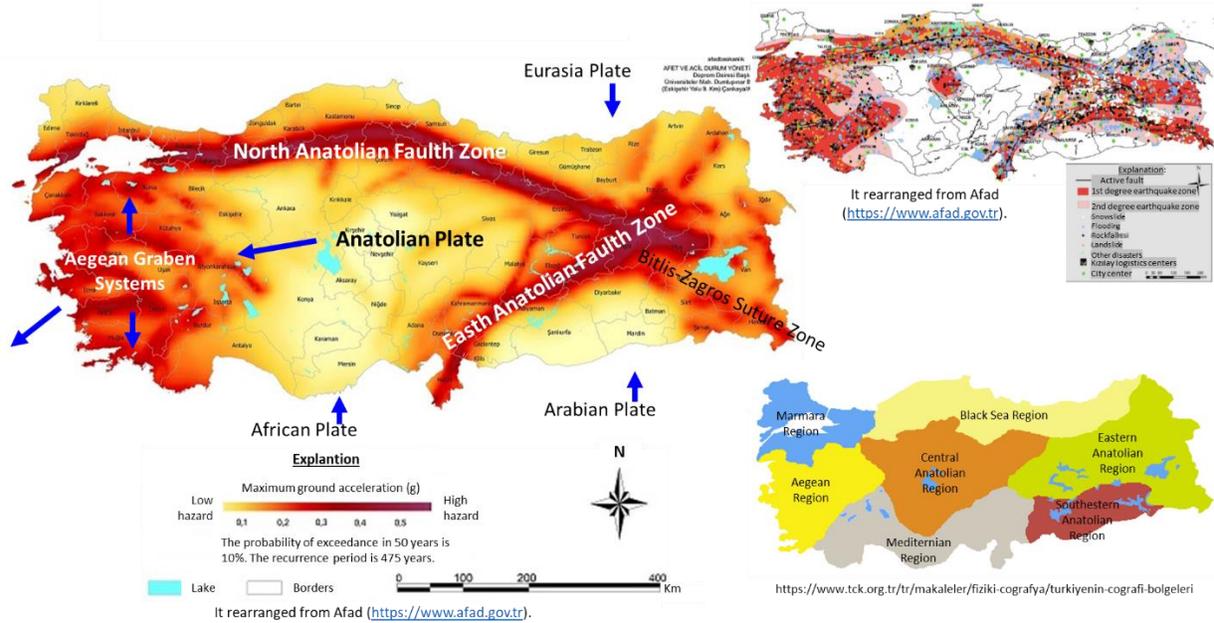


Figure 1: Earthquake hazard map of Türkiye (right), disaster types map (top left), and geographical regions map (bottom right)

In Table 2, the types of disasters are evaluated according to the seven geographical regions of Türkiye. Accordingly, it is assumed that the separate evaluation of each region in the country will be important in disaster preparedness and social awareness. The fact that, in Türkiye's geography, each region has its own geological, geographic, meteorological, topographic, urbanization, and settlement type diversity, the distribution rates of populations and age ranges in these settlements are different and variable may cause different effects on disaster preparedness and social awareness, which differ according to regions and may require learning with different preparations and education forms. Likewise, it is believed that the fact that the number of other living things (plant, animal species) is variable and their distribution rates differ is an important factor in preparing for disasters because species, national parks, ecosystems, and energy resources required for life should also be protected in disaster preparedness. To understand the importance of these differences, a classification has been made according to the types of disasters in detail and considering the source of the disaster.

Table 2: The most effective types of disasters according to Türkiye's regions

Region	Disasters Arising from Different Sources
<b>Marmara</b>	Floods and overflows, landslides, rockfalls, earthquakes, tsunamis, tornadoes, hail, snowfall, lodos, forest fires, fire/explosion/leakage caused by risky power plants/shipyards/facilities/enterprises, chemical facilities, and other industries
<b>Aegean</b>	Floods and overflows, landslides, rockfalls, earthquakes, tsunamis, tides, tornadoes, hail, lodos, forest fires, fire, explosion and leakage caused by risky power plants/shipyards/facilities/enterprises, chemical facilities, and other industries
<b>Mediterranean</b>	Floods and overflows, landslides, rockfalls, earthquakes, tornadoes, hail, storms, forest fires, fire/explosion/leakage caused by risky facilities/power plants/enterprises and other industries
<b>Central Anatolia</b>	Floods and overflows, landslides, rockfalls, earthquakes, tornadoes, hail, snowstorms, avalanches, desert dust storms, drought, fire/explosion/leakage caused by risky power plants/facilities/enterprises, chemical plants/enterprises, and other industries
<b>Black Sea</b>	Floods and overflows, landslides, rockfalls, earthquakes, tornadoes, hail, fires caused by industries
<b>Southeastern Anatolia</b>	Floods and overflows, landslides, rockfalls, earthquakes, tornadoes, hail, avalanches, extreme temperatures, drought, desert dust storms, fire/explosion/leakage caused by mining, oil, risky power plants/enterprises, chemical plants/enterprises, and other industries
<b>Eastern Anatolia</b>	Floods and overflows, landslides, rockfalls, earthquakes, hail, snowstorms, avalanches

As seen in Table 2, flood, landslide, rockfall, and earthquake disasters rank first in seven different regions. When each region is examined separately, other types of disasters are also common, and the types of disasters vary due to the unique characteristics and differences of each region. Accordingly, the 29-year disaster maps and reports of AFAD (Disaster and Emergency Management Presidency) for the years 1979-2008 were reviewed, the general disaster situation in Türkiye was evaluated, and comments were made in line with some results [2, 6]. According to the results of the examinations in [6], it was interpreted that there were repetitions with a period of 5 or 10 years for disasters throughout Türkiye, and it was observed that 1983 was the year when the number of disasters was at the highest. Moreover, it was observed that landslides, floods and overflows, and rockfall disasters increased significantly until 1999, whereas there was an increase in other types of natural disasters between 2003-2007, except for the 1999 earthquakes (August 17 and November 12), and the increase in disasters started again. Accordingly, considering the type of disaster and its location/region, it is interpreted that

the Black Sea region includes settlements affected by landslide disasters, the Central Anatolia region includes settlements affected by flood disasters, and the Western Black Sea and Eastern Anatolia regions include settlements affected by landslide, rockfall, and avalanche disasters more densely. When a comparison is made, the Black Sea, Eastern-Central Anatolia, Eastern Anatolia, Western-Southeastern, and Eastern-Mediterranean regions are observed to be the most disaster-prone regions. Furthermore, the increases in these regions in the years 1980-1985 were considerably higher than in the other years studied [6]. It can be asserted that landslides, floods, and rockfalls are mostly observed in the Black Sea and East Taurus regions due to geographical, geological, topographic (slope), meteorological (high annual precipitation), and soil structure (clay levels, geologically sloping stratification, water saturation of the soil, deforestation areas for agriculture or settlement purposes). Another result is that settlements were affected by earthquake disasters between 1992 and 2007 and other disasters (pollution\*, fire, sinkholes, cave collapse, etc.) for all years, and the settlements affected by the avalanche disaster were most actively observed in Eastern Anatolia in 1983, 1987-1993, and 1997. Finally, as one of the disaster types, it is observed that it is important to include the pollution disaster\* in the relevant laws as a disaster type [1]. One of the most important pieces of evidence for this is the environmental pollution (air, water, soil, visual, noise, asbestos, odor, etc.) that emerged after the February 6, 2023, Kahramanmaraş earthquakes, the most recent major earthquakes (affecting 11 provinces). Therefore, an infrastructure for this type of disaster should be prepared by making the necessary preparations and legal definitions, including new regulations in the existing relevant disaster laws, in addition to the definition and scope of pollution disaster in the law. Hence, it is thought that more successful disaster preparedness studies can be conducted by eliminating the deficiency in this regard for disaster preparedness studies.

### **2.1. Social Awareness in Disaster Preparedness**

Social awareness cannot be achieved only with sociological, psychological, and cultural studies and research [7, 8, 9, 10]. Earth sciences (geology, geophysics, mining) and engineering, especially construction and material sciences, along with other engineering disciplines, geography, meteorology, and basic sciences, or a few of them, are also being studied, and research should be made for social awareness in disaster preparedness [11, 12, 13, 14, 15, 16, 17, 18]. In social awareness, the human factor is the most important material, and raising awareness is a phenomenon that will take place with people. Considering how this should be achieved, the disaster preparedness process should include a continuum that can remain on the agenda by making it a more active and popular topic through faster learning. The aim of the present article is to develop and propose a suggestion/suggestions by ensuring this continuity or sustainability. Therefore,

in this respect, with the popular headings in Table 3, the product type and variety were created based on scientific knowledge, considering the regional characteristics and the target group.

Table 4 presents the products and suggestions that can be prepared in line with Table 3. The products to be designed within the scope of the popular headings in Table 3 and diversity should be evaluated together with the target group and the products to be created/proposed in Table 4. Thus, suggestions can be made about products by providing and developing the products that can be produced and ensuring their diversity. For example, two of the most popular headings in Table 3 are the NAF (Eastern Anatolia, Black Sea, Marmara) and EAF (Eastern Anatolia, Central Anatolia, Eastern Mediterranean regions). These main faults also have a wide range of impact and popularity since they cover a significant part of the five regions of Türkiye's geographical regions. Likewise, limestone karst and gypsum karst areas are large and popular areas. As another example, volcanic mountains, coastlines by three different seas, historical and cultural values, diversity, etc., enable the production of a large number of popular headings. Hence, it is observed that a lot of popular headings and products derived from them can be produced for Türkiye, according to Table 3. Hence, the high product variety for the different target groups in Table 4 and the production in very different areas result from these differences. The digital options, artificial intelligence, websites, social media, and other literary-visual-auditory areas presented in Table 4 can also enable reaching society in all kinds of ways in terms of production and sales.

Table 3: Popular place/event headings related to the most known types of disasters according to Türkiye's regions

Region	Popular Headings
Marmara	Istanbul Bosphorus, Marmara Sea, earthquake, lodos, tsunami, Uludag, Islands, Ergene River, Uluabat and Gölyazı lakes, storks, bird paradise, fire
Aegean	Marine tourism, Bodrum, Gediz graben, Kula volcanoes, earthquake, flood, landslide, rockfall, forest fire
Mediterranean	Antalya, limestone karst, Taurus mountains, karstic structures (doline, sinkhole, etc.), Seyhan and Ceyhan rivers, earthquake, tornado, hail, forest fire
Central Anatolia	Volcanic Hasandağı, Konya-Karaman limestone sinkholes, Sivas gypsum karst dolines, Tuz Lake, Cappadocia, Kızılırmak, Sumerians (volcanism map)-Hittites (agricultural irrigation dam), snowstorm, avalanche, flood, wind, sandstorm

<b>Black Sea</b>	North Anatolian Fault (NAF), Yeşilirmak, Trabzon, Artvin, landslide, rockfall, flood, earthquake, streams, storm, snowfall, avalanche, plateau, dam
<b>Southeastern Anatolia</b>	Eastern Anatolia Fault (EAF), volcanic Nemrut mountain, Euphrates and Tigris rivers, landslide, rockfall, flood, earthquake, snowfall, avalanche, extreme temperature, sandstorm
<b>Eastern Anatolia</b>	Eastern Anatolian Fault (EAF), Erzurum-Kars plateaus, Ağrı mountain, mountaineering, Hakkari Cilo glaciers, volcanic Tendürek and Süphan mountains, soda water Van Lake, Hittites, landslide, rockfall, flood, earthquake, tornado, snowstorm, avalanche

Table 4: Products that can be prepared and sold according to the target group and suggestions for disaster preparedness and raising awareness specific to popular headings in Türkiye's regions

<b>Target Group</b>	<b>Product Type/Name and Suggestion</b>
<b>Children</b>	<p>Types of toys: Pets with whom we share social life and special species that need to be protected in the wildlife of Türkiye and animals known to be from Türkiye (Hatay mountain gazelle, Mediterranean seal, Anatolian nuthatch, Anatolian leopard, etc.)</p> <p>Games: Games to learn the types of plants, trees, animals, places, mountains, rivers, water sources, etc., unique to Türkiye. Other audiovisual literary activities such as digital media/social media games, stories, songs, pictures, etc. Competitions with instant, monthly, semester prizes, or small-budget prizes. These competitions can also be memberships that can be won with regard to the popular titles of the regions, free museum or exhibition entrance, small gifts or money prizes with a small budget.</p>
<b>Young People</b>	<p>Accessories: To prepare items with a disaster theme and tourism and sales potential according to regions, such as necklaces, bracelets, earrings, rings, mugs, coasters, trinkets, magnets, pens, thermos, desktop notepads, etc., which are useful and can be used as accessories and can have a collection value.</p> <p>Textile products: T-shirts, scarves, hats, caps, decorative shoes, hair bands, textile bracelets, bags, wallets, etc.</p> <p>Digital options: Disaster-themed computer games, award-winning competitions, award-winning surveys.</p> <p>Social media posts: To give easily accessible gifts including a list of institution/organization social media addresses and invitations to receive all kinds of information about disasters.</p> <p>Social media product sales websites: Sharing the web address of the designed products and offering and selling products that will increase purchasing power.</p>

<b>Adults</b>	<p>Accessories: Designing and preparing magnets, mugs, coasters, trinkets, thermos, desktop notepads, stationery products, etc., that are suitable for daily use and can have a collection value.</p> <p>Textile products: To prepare and sell T-shirts, scarves, shoes, hair bands, textile bracelets, necklaces, bags, wallets, etc., made of modern design, useful and health materials that will affect this group and encourage purchasing.</p> <p>Digital options: Raising awareness and providing budget resources by preparing disaster-themed computer games, award-winning competitions, and award-winning surveys.</p> <p>Social media posts: To give easily accessible gifts with the list of institution/organization addresses and invitations to receive all kinds of information about disasters.</p> <p>Product sales addresses on social media and the web: Sharing social media sales addresses and web addresses for the designed products and offering and selling products that will increase purchasing power.</p>
<b>Over-adult age group</b>	<p>Textile products: Designing, producing, and selling hats, caps, T-shirts, scarves, shoes, hair bands, textile bracelets, bags, wallets, etc., that offer comfort from quality and healthy materials, which are attractive for the age group.</p> <p>Social media posts: To give easily accessible gifts with the list of institution/organization social media addresses and invitations to receive all kinds of information about disasters.</p> <p>Social media product sales websites: Sharing the web address of the designed products and offering and selling products that will increase purchasing power.</p>

As a result, the current study reveals the importance of disaster preparedness and social awareness studies, considering differences throughout the country and between regions. This can contribute to the protection of social life and natural habitats and add new values to the country in addition to Türkiye's geopolitical position and economic development. It can also contribute to the development of new business areas (ideas, projects, investments, etc.) with values that increase the prestige and income level of the country.

## 2.2. Product Suggestions for Social Awareness in Disaster Preparedness

As seen in all developed countries, the increase in a society's awareness of disaster preparedness is correlated as one of the indicators of the increase in the quality of life in those countries (e.g., Japan and Iceland, which are the most important disaster countries, etc.). In a conscious society, the advancements and skills and abilities/methods for development increase, leading to increases in the quality of social life. This parallelism contributes to the economies and social welfare of the country. Therefore, it is considered an important factor. In this respect, the suggestions that will increase and accelerate the

social awareness prepared according to different target groups in seven geographical regions throughout Türkiye are presented in Table 5. As seen in Table 5, the more important the target group and popular product creation/design are in disaster preparedness and social awareness in addition to the geographical regions, the more important the sustainability of production and sales should be. Accordingly, there must be a registered and internationally recognizable logo and symbol referring to "Disaster preparedness and social awareness" on all products. The determined logo and symbol must be printed on the product as a registered logo or symbol, and their legal rights must be protected. Thus, having a product with a brand value can result in more beneficial results that increase reliability and also contribute to tourism. According to these results, if the previous tables are considered together with Table 5, it is assumed that it can have a positive and sustainable effect, especially on young and adult target groups.

*Table 5: Some suggestions according to the type of product to be prepared for the most effective types of disasters that occur in each region according to Türkiye's regions.*

Suggestions	Suggestions for Products
<p><b>a. Product suggestions for disaster preparedness</b></p>	<p>Products to be prepared for children are considered for the 3-12 age group. These can be plush toys of popular birds and other popular animals such as volcanic mountains, storks, kingfishers, sparrows, Mediterranean seals, Anatolian leopards, etc., as well as snowmen, trees, Bosphorus bridges, and snowballs. Educational infrastructure experts should prepare products for songs, digital games, and visuals.</p> <p>In young and adult groups, all kinds of accessory production for accessories and textiles with texts on them such as "Don't be shaken, beautiful nature, beautiful Marmara, nobody, sound, lodos, flying, famous lodos, windy, water coming, NAF!, NAFZ?, Fayana, Suana, Karbaba, flood disaster, storm disaster, etc.), what is pollution!?, I saw storks, vuuu Uludağ, Istanbul Bosphorus, or ya ya sha sha sha, etc." All these can be preferred directly on the product as text, and an image made of lines suitable for the text can also be added.</p> <p>Their drawn versions are limited due to the conditions of the article and can be presented in another publication for many drawing ideas. For these target groups, digital options and social media accounts defined in Table 4, sales addresses on social media, websites and product sales sections within these sites should be prepared in a way to include scientific disaster information and visuals according to the regions, and accessories and textile products should be sold. The obtained budgets can also be used within the framework of the social project with the purpose of sustainable support to certain serious institutions such as NGOs and foundations with international standards. This will</p>

	<p>contribute to the profit share by increasing the popularity of the sectoral enterprises that produce and sell.</p> <p>For the elderly groups, a guideline covering mostly textile and all products produced on social media should be created. Since this group has reached a certain knowledge through experience or education, the posts should be designed in a way that creates a sense of respect and pride appropriate for their age.</p>
<p><b>b. Product suggestions that will raise social disaster awareness for disaster preparedness</b></p>	<p>Catchy slogans and visual cues should be created along with the products suggested for disaster preparedness, and these should be considered for young and adult groups. Accordingly, the following suggestions can be made.</p> <p><b>A.</b> Signs currently used today, such as tsunami, rockfall, and avalanche risk, can be increased. For other disaster types, measures can be extended by placing such signs in places with the risk of the relevant disaster.</p> <p><b>B.</b> A course called "Disaster Learning," such as traffic lessons in schools, can be added to the curriculum as a compulsory course, and the new generation can be trained on these subjects worldwide, across Türkiye, and specific to Türkiye's regions, and even by adding new technologies, GIS, and social media use contents to the course content.</p> <p><b>C.</b> After increasing the variety of disaster signs or as of this process, accessories and textile products can be produced. For example, products such as magnets, stickers, t-shirts, age-appropriate computer learning games, social media images, etc., can be produced.</p> <p><b>D.</b> Finally, words, sentences, and slogans that can reach the target group should be produced. Examples such as "Is there anyone there?", the unforgettable research-rescue sentence from the 1999 earthquakes, or examples such as DASK's "Don't Be Shaken" slogan should be produced, their use should be expanded, and individual and social sensitivity should be raised. A few suggestions: "I know the types of disasters in my country. I know the types of disasters in the city where I live. I know the places and sources of disaster risk where I live. I am aware of disasters. I attended the disaster awareness course. I'm learning about disasters. Where I live, only ...earthquake/avalanche/flood/landslide/pollution (this sentence should be written according to the region) disaster/disasters occur. The building where I live has a Building Identity Certificate."</p>

For this reason, to sell products, a shop/store type with a design that is primarily known for its branded sign (registered name) and can be quickly recognized and become popular should also be developed. Afterward, the number and variety of sales points can be increased by preparing sales places that can reach the public easily and quickly in shopping centers or supported by municipalities as a fully allocated area. These sales

points and their number should be increased over time, particularly in provinces and districts where disaster types are the most common, and it should be ensured that all designed products are sold in these enterprises with a region-specific promotional pocketbook or brochure related to disasters. In addition to the products and suggestions proposed for disaster preparedness, catchy slogans and visual signs should also be developed, and social awareness studies and their continuity in terms of sustainability should be ensured. Furthermore, owing to the products to be produced for disaster preparedness and social awareness about disasters in Table 5, it is assumed that there may be results that will add value to the country's economy, promotion, and tourism while teaching and disseminating the use of science-based knowledge and creating employment opportunities. Thus, it is predicted that the goal of raising social awareness more quickly can be achieved with the suggestion of various products that can be sold by creating disaster awareness for disaster preparedness.

### **3. Results**

In the present study, suggestions for producing various products on the basis of earth sciences, product design characteristics, promotions, and sales of these products are proposed with tables that enhance learning and highlight the sustainability of learning in disaster preparedness and social awareness according to Türkiye's seven regions with different geographical characteristics. While preparing the tables, the diversity of disaster types, target groups, and regional differences of Türkiye were taken into account. Emphasis was put on the geological, geographical, meteorological, topographic, urbanization, and settlement type diversity of seven different regions. Thus, the diversity of disaster types, all characteristics of the regions, and the importance of producing and selling products according to the target group and regional characteristics were stated. Suggestions were made with regard to creating simpler, fast, and sustainable forms of education and learning to reach the public and scientific information and the production and sale of products. Along with the products sold, the importance of providing the buyer with a disaster book or brochure prepared only for that region was emphasized. Moreover, it was stressed that all products should have a registered and internationally recognizable logo and symbol that expresses "disaster preparedness and social awareness" for the sustainability of production and sales and to build trust. In this way, it is predicted that teaching and spreading the use of science-based knowledge owing to products and product sales may add value to the country's economy, promotion, and tourism, as well as creating employment opportunities, and the goal of raising social awareness more quickly can be achieved. It was also thought that all products produced for the store/shop, social media, and web environment could provide sustainable budget

resources to NGOs of national and international importance within the scope of the social project, and their importance was explained.

#### 4. Discussion

In this article, details about product variety and sales were foreseen and proposed by keeping them open for development. It is impossible to stay limited to a single goal in terms of product name or opinion. Visual studies should also be supported as a product. For example, visual examples such as cartoon drawings, artistic paintings, symbolic sculptures, and products from other fields of art can be designed and used in addition to graphic and other design works, and artistic photography. Moreover, suggestions should be developed in many different aspects, such as instant, daily, monthly, and annual short- and long-term competitions, campaigns, promotional days, and exhibitions in various categories, which will raise awareness. Although this article was prepared in writing, it was emphasized throughout the article to conduct suggestion studies in the visual category.

#### References

- [1] Özel, S. (2020). Afetlerden sonra kirlilik ve ikincil kirliliği afet olarak değerlendirmek için tartışma. İleri Mühendislik Çalışmaları ve Teknolojileri Dergisi 1(1), 39-48.
- [2] AFAD (2023a). Afet ve Acil Durum Yönetim Başkanlığı E-Kütüphane. <https://www.afad.gov.tr/afete-hazir-turkiye> ve <https://www.afad.gov.tr/afet-turleri> (Son Erişim: 24.10.2023)
- [3] KRDAE (2023). Boğaziçi Üniversitesi Kandilli Rasathanesi ve Deprem Araştırma Enstitüsü Bölgesel Deprem-Tsunami İzleme ve Değerlendirme Merkezi ve Boğaziçi Üniversitesi Kandilli rasathanesi Deprem Araştırma Entitüsü, İstanbul. <http://www.koeri.boun.edu.tr/sismo/2/tr/> ve <http://www.koeri.boun.edu.tr/new/> (Son erişim: 24.10.2023)
- [4] HGK (2023). Harita Genel Komutanlığı, Ürünler, İndirilebilir ürünler, Özel üretim haritalar. <https://www.harita.gov.tr/urunler> ve <https://www.harita.gov.tr/urunler/ozel-malzeme-haritalar/19> (Son erişim: 24.10.2023)
- [5] Resmi Gazete (2023). <https://www.resmigazete.gov.tr/eskiler/2020/07/20200729-1.htm> (Son Erişim: 18.10.2023)
- [6] AFAD (2023b). Afet ve Acil Durum Yönetim Başkanlığı, Afet haritaları ve Afet raporları. <https://www.afad.gov.tr/afet-haritalari> (Son erişim: 24.10.2023)
- [7] <https://tdth.afad.gov.tr/TDTH/main.xhtml> (Son Erişim: 02.06.2023)
- [8] Altun, F. (2018). Afetlerin ekonomik ve sosyal etkileri: Türkiye örneği üzerinden bir değerlendirme. Sosyal Çalışma Dergisi 2 (1), 1-15. <https://dergipark.org.tr/tr/pub/scd/issue/37934/414035>
- [9] Karancı, N. (2008). Afet zararlarını azaltmada psikolojinin önemi. JICA (Japonya Uluslararası İşbirliği Ajansı) Türkiye Ofisi Yayınları, 2, 51-57, Ankara.
- [10] Kadioğlu, M. (2008). Modern bütünleşik afet yönetimin temel ilkeleri, afet zararlarını azaltmanın temel ilkeleri-1, Editörler M. Kadioğlu ve E. Özdamar. JICA (Japonya Uluslararası İşbirliği Ajansı) Türkiye Ofisi Yayınları No:2, 1-34, 251-276, Ankara.
- [11] Tezer, A., Türkoğlu, H. (2008). Zarar azaltma ve şehir planlama. JICA (Japonya Uluslararası İşbirliği Ajansı) Türkiye Ofisi Yayınları No:2, 58-72, Ankara.

- [12] JFMO, (2023). Jeofizik Mühendisler Odası Genel Merkezi yayınları. Jeofizik Mühendisleri Odası yayınları, Ankara. <https://www.jeofizik.org.tr/yayinlar/Kitap>
- [13] JMO (2023). Jeoloji Mühendisleri Odası Genel Merkezi Ankara, [www.jmo.org.tr](http://www.jmo.org.tr) (Son Erişim: 20.10.2023)
- [14] JEODER (2023). Jeomorfoloji Derneği (Turkish Society for Geomorphology-TSG), Yayınları, Araştırmaları, Jeomorfoloji Derneği Bülteni. [www.jd.org.tr](http://www.jd.org.tr)
- [15] JADER (2023). Jeomorfolojik Araştırmalar Dergisi. <http://jd.org.tr/en/node/94>
- [16] MGM (2023). Meteoroloji Genel Müdürlüğü, Yayınlar ve Meteorolojik veriler. [www.mgm.gov.tr](http://www.mgm.gov.tr) (Son Erişim: 20.10.2023)
- [17] Özer A., Buğdaycı R., Bulut, İ. (2023). Deprem alanlarında çevre sağlığı Kılavuzu. T.C. Sağlık Bakanlığı Halk Sağlığı Genel Müdürlüğü.
- [18] Şahin, Ş. (2019). Türkiye’de afet yönetimi ve 2023 hedefleri. Turkish Journal of Earthquake Research 1 (2), 180-196. <https://doi.org/10.46464/tdad.600455> (Son Erişim: 24.02.2023)