

## GREEN APPS SHAPING AWARENESS VIA VIRTUAL WORLD


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**ABSTRACT.** Many people have smartphones or tablet PCs nowadays; therefore, the application world has been enlarging with unpredictable speed. So, it can be used to raise awareness among people about living greener. Application developers have discovered that demand and create some useful and intuitive applications for mobile devices. The market share of smartphones in the U.S. is now reported to be more than 40%. Smartphones are proliferating around the world, and along with them, green apps are rising. Eco-apps can help people make their energy consumption more efficient and lower. Ecologically oriented apps are organized around a number of categories, including transportation, education, energy, consumer information, air and water quality, food, visualizations, and chemicals. In this study, these applications have been detected through Google Play Store and AppStore – for both iOS and Android devices and information gathered about their aim, use, and rates on stores.

**Keywords:** *green applications, green technology, nature-friendly technology, eco-apps, sustainable behavior.*

### INTRODUCTION

The Earth started over 4.5 billion years ago; but according to scientists, this planet's existence can only last a thousand years because of the constant abuse of the atmosphere by human activity. Adverse effects of humankind on earth have been rapidly sprawling all around the globe since the beginning of industrial revolution. This stress is getting worse day by day along with capitalist technological progress, but there are also green technologies which try to emerge a new era of consciousness. Fortunately, as we step further into this technological era, the rise of green technologies and environmental entrepreneurs makes a sustainable future possible.

Mobile phones used to be used just for making calls, but now they can do a lot more. The range of new touchscreen smartphones makes it possible to access the internet, use social media, get updates from live news, play music and video, etc. Nevertheless, they use touch screens almost exclusively for control, which can be a challenge for people new to the technology.

The worldwide mobile industry will accomplish more records throughout the following eight years and having outperformed 5 billion individuals associated with versatile administrations in 2017. By 2025, the quantity of one of a kind versatile endorser will arrive at 5.9 billion, reflecting 71% of the total populace. Creating nations, especially India, China, Pakistan, Indonesia and Bangladesh, just as sub-Saharan Africa and Latin America, will drive development [1].

Reviewing living-green can go past a suggestion like putting out reusing materials, purchasing natural goods, and saving all your compost peelings. Environmentalist

applications have newly expanded their borders to help people living greener. They appeal to both ecological crusaders with all their need, like local organic food stalls, and those of us who have just woken up to the whole living-green thing. The diversity of green apps (in some articles, called as eco-apps) out there reflects the fact that there are many ways in which to eco-fy your daily grind, from commuting choices to shopping decisions to energy consumption. Most of these applications are based on monitoring your acts and recommending how to make them a little greener — such as taking public transit, or not using the clothes dryer. Others are lists of ideas for improving or information on various locations and companies.

There is no question that there is a significant contribution to the wellbeing of the earth and its people from the huge and growing green app market. Technology may not be a panacea to solve the climate crisis, but eco-apps are helping to raise awareness and foster responsible action. Green-themed applications have now converted mobile devices into platforms for information and proactive action on the environment.

The market share of smartphones in the U.S. is now reported to be more than 40%. Smartphones are proliferating around the world, and along with them green apps are rising. Eco-apps can help people make their energy consumption more efficient and lower.

There are a wide range of energy applications, including those tracking production and usage. Apps assist with issues such as recycling and other green living aspects. Smart technology apps based on smartphones and tablets help customers automate their energy and water usage, track their appliances, water heaters, and other electronics. These apps can also monitor and operate HVAC (Heating, Ventilating and Air Conditioning), automated windows (shutters and blinds), grey water (from rain) and lighting systems. They can even provide information about renewable energy conversion and variable price grid management.

Reducing the impact of climate change on earth and also reducing the burden of noncommunicable diseases are significant global challenges [2, 3]. A strong connection exists between climate change and public health, which can be showed clearly by measuring greenhouse gas emissions. For instance, increased use of motorized transport leads to increased greenhouse gas emissions, by that contributing to climate change as well as reducing physical activity levels, which has been linked to the development of many noncommunicable diseases [4, 5]. Transport is expected to account for about 22 percent of the world's energy-related carbon emissions due to increased dependence on motorized transport in both developed and developing countries [6, 7]. Although motorized transport in the industrialized world can be time-efficient, it contributes to the issue of physical inactivity and sedentary behavior, which has been described as major behavioral risk factors leading to many non-communicable diseases and their determinants, causing approximately 3.2 million deaths each year [4, 8]. Agriculture accounts for nearly 31 per cent of global greenhouse gas emissions with much of the emissions from livestock production, including ruminant digestion methane, fertilizer nitric oxide, and deforestation / felled vegetation and fossil fuel use [9, 10].

There is a growing need for cost-effective, limited intervention approaches to promote and inspire improvements in person behaviors. Such methods should be based on only simple measures such as “leave the car at home today” [5, 11], and “eat a vegetarian meal” [12, 13]. Individual knowledge of small, easy steps that shrink personal carbon footprints and reduce the risk of disease that increase people's awareness and willingness to deal with large-scale issues such as climate change and obesogenic environments,

which otherwise seem unlikely to be overwhelming and distant [14]. Therefore, beyond top-down approaches evaluating the effect of policy changes and managerial or technical initiatives, it is important to tackle individual level behavior. Such a bottom-up approach can be more effective in addressing health and environmental issues [15].

Ecologically oriented apps are organized around several categories including air and water quality, transportation, energy, education (games), consumer information, food and visualizations and chemicals. In this study, these applications have been detected through Google Play Store and AppStore – for both iOS and Android devices and information gathered about their aim, use and rates on stores.

There is no doubt that the world is becoming more virtual, and we all are in need of some smart devices throughout a day to make life simpler. In this ecologically deteriorated world, it is a wise way to grab people's attention with technological agents. With this research, it is aimed to demonstrate the current status of ecologically oriented applications, if they are useful, appeal to the people, and raising awareness.

## **MATERIALS AND METHODS**

Material of this work consists of the apps which are in use of mobile devices. There are countless applications about living greener; to reduce the number of those apps, just high ranked ones (all which has five stars of five) in Appstore and Google Play Store are selected. Information about their rates, usage, aims are gathered in this research. In the scope of this research, 553 applications have been selected and they are grouped in 9 different classes due to their extend, scope and aims; and their benefits have been discussed.

Searching for these apps has been carried out on Google Play Store and Appstore, as mentioned above. Usage information, aim and scope of the apps exist on these platforms. Google Play Store and Appstore are not mentioned in references, but most of the information about applications gathered from there. Samsung's new operating system Tizen's store is very new and there are not many applications produced for it. And Blackberry operating system is too old and has not been renewed for a long time. That's why green applications have been searched on just Google Play Store and Appstore.

Some of the apps those have been selected for the research are being downloaded all over the world, but some of them are just allowed to download in their country. So, some of the applications that will be mentioned cannot be found on Turkish Appstore or Google Play Store.

## **RESULTS AND DISCUSSION**

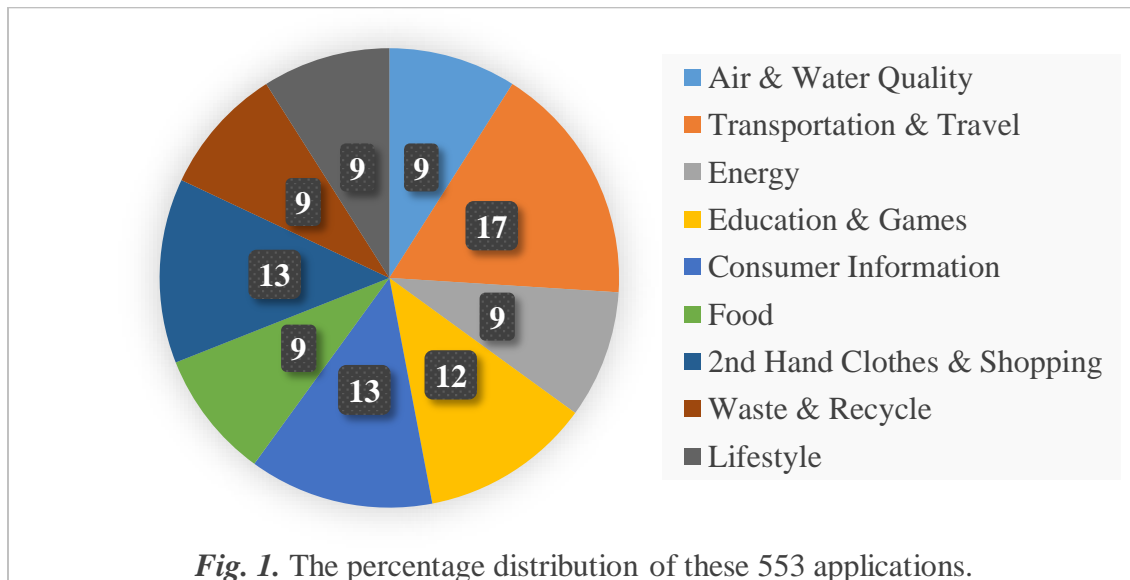
Effects of Climate Change are becoming worse and disturbing the overall culture of living being. Increased carbon dioxide emissions tend to the greenhouse effect and the heat emerged from that, melts the ice of the poles and the ocean that worsens the weather and expands the oceans. Uneven weather is a major threat to agriculture that reduces outcome or destroys all crops in a single attempt. Polluted air directly affects the human respiratory system, causing different health disorders. Polluted water also leads to different diseases of stomach, eyes, bones, and much more. Pollution not only affects the humans, but also all living beings. Species dependent on forests, polar/sea ice, etc. are

vanishing. These effects make human beings to take efforts for changing their living style for the survival of self and the entire world.

Many efficient efforts have been done and are going on to reduce or stop emissions of carbon and other pollutants into our atmosphere like; use of hydrogen in vehicles, use of solar/wind/tidal/water energy for power production. All these efforts are limited to specific authorities, but from an individual point of view, that needs different solutions. Growing mobile technology helps a lot through the mobile apps which guide an individual towards the cleaner environment that results in great future and health of living being. There are thousands of apps specially developed for an ecological purpose. This large growing eco-apps market is making a significant effect on cleaner and greener future of our planet and its inhabitants.

More than 10 million apps are available and an increasing number of them have an ecological function. The immense and rising demand for eco-apps is making a significant contribution to the planet's wellbeing and its inhabitants. In 2008, there were 800.000 eco-apps; this number increased to 2.2 million apps in 2016 [16].

553 applications which are ecologically oriented has been selected based on just if they get 5 stars on the Appstore and Google Play. To clarify their scopes, aims and topics, they have been classified under 9 different titles like air & water quality, transportation & travel, energy, education & games, consumer information, food, 2nd hand clothes and shopping, waste & recycle, and lifestyle. The percentage distribution of these 553 applications according to the classifications is as follows in Figure 1. These titles' scope, and the most outstanding applications have been given in the Table 1.



**Table 1.** Classifying green apps and their scope along with the most outstanding samples.

Title	Scope	The most outstanding apps
<b>Air &amp; water quality</b>	informing about local pollution sources on water and air, getting location-based reports about current quality of air and	EPA AirNOW, State of the Air, Bluesky Map, Dropcountr,

	forecasts for both ozone layer, air pollution caused by fine particles, etc.	Pollution, Smokesense,
<b>Transportation &amp; travel</b>	allowing travelers to measure the carbon emissions related to their air travel, finding alternative fueling stations like natural gas, propane and hydrogen, electricity, e85 Ethanol, biodiesel, helping you find nearby people to share commute, pollution, and travel costs, etc.	GiveO <sub>2</sub> , Commute Greener, Greenglobe, Spinlister, Bla Bla Car, Gashog, Waze, Roadify, Carma Carpooling, Zimride, Alternative Fueling Station Locator, Avego
<b>Energy</b>	helping people save energy, reduce emissions, allowing you to assess your home's solar potential, making it easy to read and understand your energy bills, etc.	Leaffully, Google's Project Sunroof, OHMconnect, Ecocharge, VeloBill, Energy Consumption Analyzer, Entelligo Home, Windfarm
<b>Education &amp; games</b>	providing daily green tips as well as solar, wind, water and lightning calculators, helping you discover and share steps you can take to fight climate change, promoting social sustainability through eco-friendly activity news feeds, updates on eco-friendly hints and products that help you save electricity, conserve water, and other ways for reducing environmental impact, etc.	#climate, Ecoviate, Oroeco, Green Wars, Gro Memo, Water1Der, Eco Action Trumps, One Stop Green, Tara Brach
<b>Consumer information</b>	helping people find safe, affordable, wholesome, green and ethical goods through product reviews based on scientific research and ratings, providing information on the products of a daily basis and what our purchases actually endorse, sharing information on leading companies based on their climate impact and sustainability initiatives, encouraging users to check whether a business is cruelty-free, not testing anything on animals, making it easy to stay informed and support companies with behaviors that are in line with values etc.	Boycott, Good Guide, Ethical Barcode, Toxic Baby, Cruelty-Cutter, Think Dirty, InFURno, EWG's Healthy Living, Greening your family, Light Bulb Finder, Humane Eating Project, Thrive Market, Climate Counts,
<b>Food</b>	finding locally grown foods from markets around the world, finding food that is ethical and sustainable, empowering food	Farmstand, My Terrace Garden, Too Good To Go, Wise Up

	shoppers around the world to make healthy choices, well-informed decisions, informing people which vegetables and fruits are fresh in time and how long they will be in season, allowing consumers to discover local vegan, vegetarian, gluten-free, locally-grown and organic restaurants, sharing dishes etc.	On Waste, Fair Food Forager, The Seasonal Food Guide, Seafood Watch, Lovicore, Sustainable Seafood Guide, Olio, Happy Cow
<b>2nd hand clothes &amp; shopping</b>	selling, buying and swapping clothes, books, allowing you to make money selling what you don't need and find great deals nearby on what you do, etc.	LetGo, Wallpop, Tradesy, Vinted, Poshmark, Taaze, Carousell, ThredUP. reGAIN
<b>Waste &amp; recycle</b>	finding local, convenient recycling opportunities when you are on the go or at home, clarifying water and energy consume, reusing tips about different wastes	iRecycle, Greenmeter, Pollution free, Waste no water, ecoFootPrint, Waterprint, Zerocarbon, My CO <sub>2</sub> Calculator, MyPlanet.
<b>Lifestyle</b>	pursuing one's own ecological footprint, how to reduce carbon emission with simple habits, water consuming critics, etc.	Eco-dice, Green Genie, Green me, Ecofootprint, Waterprint, Zerocarbon, My CO <sub>2</sub> Calculator

Some of these applications are just in use in USA, Canada, Australia, and Europe; but a number of them are global. Furthermore, some of these applications have rewarded as following; Best Overall Application – GrandPrize2016 (Leaffully) [17], United States Environmental Protection Agency (EPA) Best Application (EPA AirNOW, Smokesense) [18]. Best Overall Application – GoldPrize2013 (MyPlanet) [19].

On the other side, research about consumer behaviour to date shown that the attitude of customers is hard to change as it is highly routinized and taken for granted for the most time [20]. Using either an individualistic or a systematic approach, research and policy approaches on changing consumer behaviour have been developed. Neither approach works effectively, though. The individualistic approach appears to underestimate the impact of context and the role of routines and habits in influencing behaviours of daily life consumption [21]. But the continuing digitization of society has a huge impact on the habits of consumers. Digitalization of social practices has emerged as a clear trend in many specific and profound ways impacting the near future [22, 23].

The consumers have played a significant role in the going green. Industries can delay going green by becoming eco-minded and increasing demand for environmentally friendly goods, but they cannot avoid it. The Nielsen Company carried out a study in 2015. According to that study, millennials are keen to spend more money for products that are environmentally friendly. The Nielsen Global Survey of Corporate Social

Responsibility and Sustainability was conducted between Feb. 23 – March 13, 2015, with more than 30,000 online consumers in 60 different countries from Europe, the Middle East/Africa, Asia-Pacific, Latin America, and North America. Even though Millennials are coming of age in one of the most difficult economic climates in the past 100 years, a recent Nielsen global online study found that they continue to be most willing to pay extra for sustainable offerings—almost three-out-of-four respondents in the latest findings, up from approximately half in 2014 [25].

Organizations have started making applications to make a positive impact on our world and involve the millennial audience in ecology movements. While the eco-apps can't be an actual solution, everybody can take small steps towards a cleaner environment on a daily basis with just a few clicks on smartphone. Eco-apps can assist us to create a habit of making more environmentally friendly choices and transitioning to a "green mindset." Application developers have found a way to create applications that will help you pay more attention to the environment, while consumers now have a fun and simple tool that will help them shift their daily behaviors and increase awareness of their environmental impact.

## CONCLUSION

Effects of Climate Change are becoming worse and disturbing the overall culture of living being. Increased carbon dioxide emissions tend to the greenhouse effect and the heat emerged from that, melts the ice of the poles and the ocean that worsens the weather and expands the oceans. Uneven weather is a major threat to agriculture that reduces outcome or destroys all crops in a single attempt. Polluted air directly affects the human respiratory system, causing different health disorders. Polluted water also leads to different diseases of stomach, eyes, bones, and much more. Pollution not only affects the humans, but also all living beings. Species dependent on forests, polar/sea ice, etc. are vanishing. These effects make human beings to take efforts for changing their living style for the survival of self and the entire world. Many fruitful efforts have been done and are going on to reduce or stop emissions of carbon and other pollutants into our atmosphere like; use of hydrogen in vehicles, use of solar / wind / tidal / water energy for power production. All these efforts are limited to specific authorities, but from an individual point of view, that needs different solutions. Growing mobile technology helps a lot through the mobile apps which guide an individual towards the cleaner environment that results in great future and health of living being.

## REFERENCES

- [1] The Mobile Economy (2018). GSMA Association. London EC4N 8AF, United Kingdom, 60p.
- [2] Woodward A, Smith KR, Campbell-Lendrum D, Chadee DD, Honda Y, Liu Q, Olwoch J, Revich B, Sauerborn R, Chafe Z, Confalonieri U, Haines A. (2014). Climate change and health: on the latest IPCC report. *Lancet*. 2014 Apr 5;383(9924):1185–1189. doi: 10.1016/S0140-6736(14)60576-6.
- [3] McMichael AJ, Powles JW, Butler CD, Uauy R. (2007). Food, livestock production, energy, climate change, and health. *Lancet*. 2007 Oct 6; 370 (9594): 1253–1263. doi: 10.1016/S0140-6736(07)61256-2.

- [4] Mendis S, Armstrong T, Bettcher D, Branca F, Lauer J, Mace C, Poznyak V, Riley L, Silva V, Stevens G, Tang K. (2015). Global status report on noncommunicable diseases. Switzerland: World Health Organization.
- [5] Lindsay G, Macmillan A, Woodward A. (2011). Moving urban trips from cars to bicycles: impact on health and emissions. *Aust N Z J Public Health*. 2011 Feb; 35(1): 54–60. doi: 10.1111/j.1753-6405.2010.00621.
- [6] Friel S, Bowen K, Campbell-Lendrum D, Frumkin H, McMichael AJ, Rasanathan K. (2011). Climate change, noncommunicable diseases, and development: the relationships and common policy opportunities. *Annu Rev Public Health*. 2011; 32: 133–147. doi: 10.1146/annurev-publhealth-071910-140612.
- [7] Shaw C, Hales S, Howden-Chapman P, Edwards R. (2014). Health co-benefits of climate change mitigation policies in the transport sector. *Nature Climate change*. 2014 May 28;4(6):427–433. doi: 10.1038/NCLIMATE2247.
- [8] Marmot M, Atinmo T, Byers T, Chen J, Hirohata T, Jackson A, James W, Kolonel L, Kumanyika S, Leitzmann C, Mann J. (2007). Food, nutrition, physical activity, and the prevention of cancer: a global perspective. Washington, DC: World Cancer Research Fund/American Institute for Cancer Research; 2007.
- [9] Haines A, Smith KR, Anderson D, Epstein PR, McMichael AJ, Roberts I, Wilkinson P, Woodcock J, Woods J. (2007). Policies for accelerating access to clean energy, improving health, advancing development, and mitigating climate change. *Lancet*. 2007 Oct 6; 370(9594): 1264–1281. doi: 10.1016/S0140-6736(07)61257-4.
- [10] Garnett T. (2011). Where are the best opportunities for reducing greenhouse gas emissions in the food system (including the food chain)? *Food Policy*. 2011 Jan; 36: 23-32. doi: 10.1016/j.foodpol.2010.10.010.
- [11] Macmillan A, Connor J, Witten K, Kearns R, Rees D, Woodward A. (2014). The societal costs and benefits of commuter bicycling: simulating the effects of specific policies using system dynamics modeling. *Environ Health Perspect*. 2014 Apr; 122 (4): 335–344. doi: 10.1289/ehp.1307250.
- [12] McMichael A. J. (2013). Globalization, climate change, and human health. *N Engl J Med*. 2013 Apr 4;368(14): 1335–1343. doi: 10.1056/NEJMr1109341.
- [13] Opio C, Gerber P, Mottet A, Falcucci A, Tempio G, MacLeod M, Vellinga T, Henderson B, Steinfeld H. (2013). Greenhouse gas emissions from ruminant supply chains: a global life cycle assessment. Rome: Food and Agriculture Organization of the United Nations; 2013.
- [14] Lorenzoni, I, Nicholson-Cole S, Whitmarsh L. (2007). Barriers perceived to engaging with climate change among the UK public and their policy implications. *Global Environmental Change*. 2007 Aug;17. (3-4): 445–459. doi: 10.1016/j.gloenvcha.2007.01.
- [15] Sullivan, R. K., Marsh, S., Halvarsson, J., Holdsworth, M., Waterlander, W., Poelman, M. P., Salmond, J. A., Christian, H., SC Koh, L., Cade, E. J., Spence, J. C., Woodward, A., Maddison, R. (2016). Smartphone Apps for Measuring Human Health and Climate Change Co-Benefits: A Comparison and Quality Rating of Available Apps. *JMIR Mhealth Uhealth*. 2016 Oct-Dec; 4(4): e135.
- [16] Statista (2018). Eco-apps. [www.statista.com](http://www.statista.com). Retrieved: 29.05.2018.

- [17] Apps for energy: Leaffully. Website: <https://appsforenergy.devpost.com/submissions/7987-leaffully>, Retrieved: 20.05.2018.
- [18] US Environmental Protection Agency, Category: Applications. Website: <https://developer.epa.gov/category/apps/>, Retrieved: 10.06.2018.
- [19] Best Mobile Apps Awards. Website: <https://bestmobileappawards.com/app-submission/my-planet>, Retrieved: 13.06.2018.
- [20] Spaargaren G (2003). Sustainable Consumption: A Theoretical and Environmental Policy Perspective. *Soc. Nat. Resour.* 2003, 16, 687–701.
- [21] Spaargaren G (2011). Theories of practices: Agency, technology, and culture: Exploring the relevance of practice theories for the governance of sustainable consumption practices in the new world-order. *Glob. Environ. Chang.* 2011, 21, 813–822.
- [22] Davies AR (2014). Co-creating sustainable eating futures: Technology, ICT and citizen–consumer ambivalence. *Futures* 2014, 62, 181–193.
- [23] Huber MZ and Hilty LM (2015). *Gamification and Sustainable Consumption: Overcoming the Limitations of Persuasive Technologies*; Springer International Publishing: Cham, Switzerland, 2015; pp. 367–385.
- [24] Nielsen Global Connect (2015). Green Generation: Millennials Say Sustainability Is a Shopping Priority. Website: <https://www.nielsen.com/us/en/insights/article/2015/green-generation-millennials-say-sustainability-is-a-shopping-priority/>. Retrieved: 23.03.2019.