UNEARTHING THE ENVIRONMENTAL INMPACT OF HUMAN ACTIVITY: A GLOBAL CO2 EMISSION ANALYSIS

1 INTRODUCTION:

1.1 Overview

Global emissions of carbon dioxide have more than doubled since 1975, increasing on average 2% per year. In 1975, the current OECD countries were responsible for 67% of world CO2 emissions. As a consequence of rapidly rising emissions in the developing world, the OECD contribution to the total fell to 37% in 2013. By far, the largest increase in non-OECD countries occurred in Asia, where China's emissions of CO2 from fuel combustion have risen, on average, by 6% per annum between 1974 and 2013. Driven primarily by increased use of coal, CO2 emissions from fuel combustion in China increased over tenfold between 1974 and 2013. Two significant downturns in OECD CO2 emissions occurred following the oil shocks of the mid-1970s and early 1980s. Emissions from the economies in transition declined in the 1990s, helping to offset the OECD increases between 1990 and the present. However, this decline did not stabilize global emissions as emissions in developing countries continued to grow. With the economic crisis in

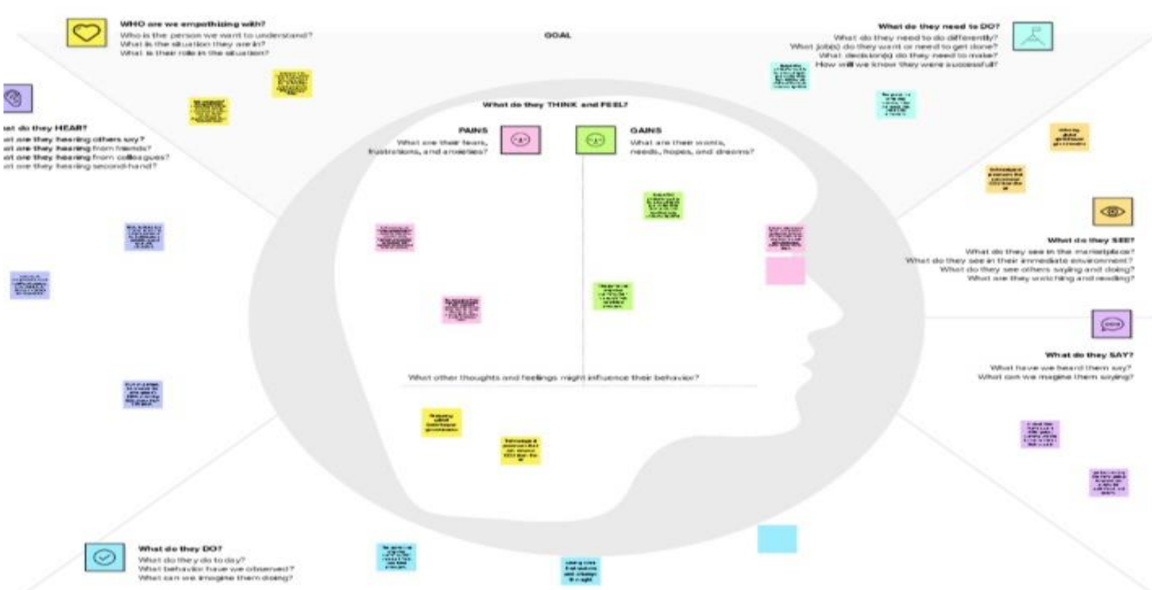
2008/2009, world CO_2 emissions declined by 2% in 2009. However, growth in CO_2 emissions have rebounded, with emissions increasing by 1% in 2012 and 2% in 2013. Disaggregating the emissions estimates shows substantial variations within individual sectors. Between 1971 and 2013, the combined share of electricity and heat generation and transport shifted from one-half to two-thirds of the total. The share of the respective fuels in overall emissions also changed significantly during the period. The share of oil decreased from 48% to 34%, while the share of natural gas increased from 15% to 20% and that of coal in global emissions increased from 38% to 46%. Fuel switching, including the penetration of nuclear, and the increasing use of other non-fossil energy sources only reduced the CO_2/total primary energy supply ratio by 6% over the past 40 years.

1.2 Purpose

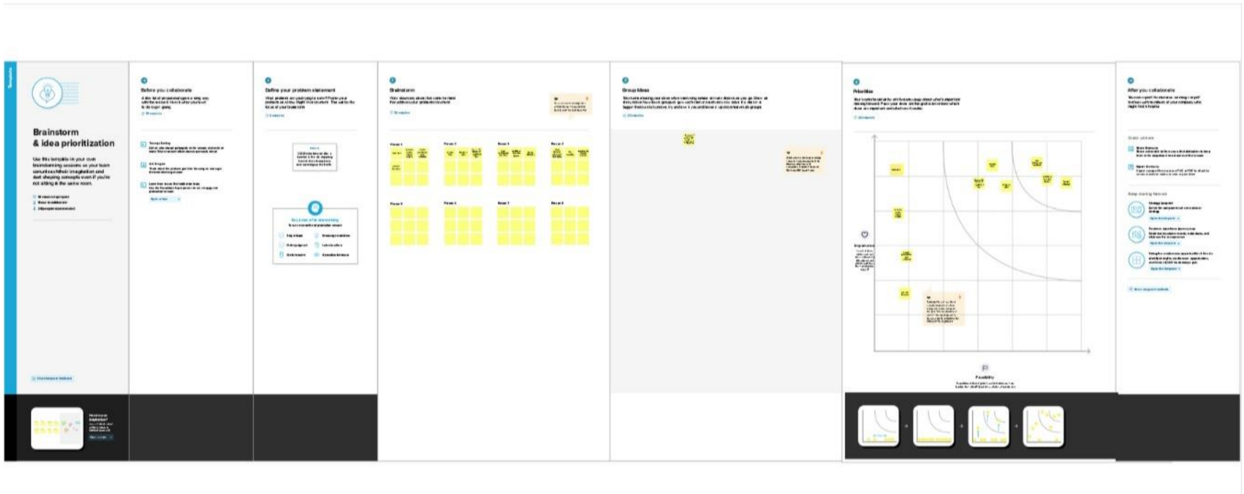
Global warming is one of the biggest challenges currently being faced by the human race, although correlation is not causation, a likely cause of global warming is due to increased atmospheric carbon dioxide from human activities. CO_2 Emission refers to the Carbon Dioxide emitted throughout the world. For this analysis we will be focusing on CO_2 Emissions and its effect on the world we live in as well as some key factors and stats that may play a role in the emission of CO_2 globally. Fossil fuel use is the primary source of CO_2. The data throws light onto how much fossil fuels are burnt, per year per nation, which amounts to an increase in CO_2 every year. This will help researchers and environment experts to predict global warming. So, countries should set a goal to decrease this amount yearly. Analyzing Global Co2 Emission across countries from 1975 to 2020. This dataset contains a record of Co2 Emission by each Country and Region of Earth, here we are going to analysis and visualize Country wise, Region wise and Overall Co2 Emission on Earth.

2 PROBLEM DEFINITION & DESIGN THINKING

2.1 Empathy Map



2.2 Ideation & Brainstorming Map



Definition:

Emissions refer to CO2 from burning oil, coal, natural gas and waste materials for energy use. Carbon dioxide also enters the atmosphere from deforestation and from some industrial processes such as cement production. However, emissions of CO2 from these other sources represent a smaller share of global emissions, and are not included. The 2006 IPCC Guidelines for National Greenhouse Gas Inventories provide a fuller, technical definition of how CO2 emissions have been estimated

PROBLEM:

Decisions on future energy supply systems should be made with regard to the alternatives available. Therefore, information is needed on the risks and benefits of these systems. The risks of nuclear power have been discussed at great length; in this discussion, nuclear power has played the role of a symbol expressing concern about technology. However, to arrive at rational decisions, nuclear power has to be seen in perspective, i.e., with regard to the benefits and the risks of the alternatives. One of the risks of possible long-term global concern is the emission of carbon dioxide (CO2) from fossil fuel consumption.

WHY IS CARBON DIOXIDE A PROBLEM?

At the levels discussed here, CO2 is not toxic and one should not confuse it with the highly toxic carbon monoxide. On the contrary, CO2 increases plant growth as it provides, together with water, the basic materials needed for photosynthesis. The principal risk of an increase in atmospheric C02-concentration IS its impact on the radiation balance of the atmosphere, the so-called "greenhouse" effect. As the reflectivity (albedo) of the atmosphere is about 29%, the theoretical equilibrium temperature can be calculated as -19°C, or 34°C less than the observed average of about + 15°C This important difference, which is necessary for life on earth, is caused by the fact that the atmosphere provides a window (48% transparent) for the incoming solar radiation but absorbs (20% transparent) the infrared radiation emitted from the earth's surface. Thus, the atmosphere acts as a blanket to keep the earth warm. This effect is similar to the role glass roofs play for greenhouses, after which this effect has been named. It is mainly caused by water vapor and carbon dioxide. Models simulating this behavior of the atmosphere have been used to calculate the effects of a change in carbon dioxide concentration All calculations agree quite well that the temperature increase due to a doubling of atmospheric CO_2-concentration will be between about 2°C and 3°C, depending on assumptions about other parameters (fixed cloud-top altitude or fixed cloud-top temperature) Figure 2 shows the lower estimate of a temperature response plotted against CO_2-concentrations , It shows contributions of two absorption bands, with one levelling off at higher concentrations. Up to a doubling of atmospheric C02-concentration the response curve IS almost linear. These data refer to temperature changes in the lower troposphere the temperature change decreases with altitude and even becomes negative beyond a height of about 10 km. This relationship has been a point of great confusion in the past as it had been pointed out that today's C02-concentration would already absorb 98.5% of the radiation in the relevant absorption bands. This led to the wrong conclusion that the CO_2-effect could only be minimal However, demonstrates that although this is true for the total atmosphere, a significant warming occurs in the lower troposphere because for a doubling of CO_2-concentration only half the pathlength is required for the same absorption. The data given are representative for low and middle latitudes. The more stable conditions in polar and subpolar regions require that an amplifying factor of about 3 be considered for these latitudes.

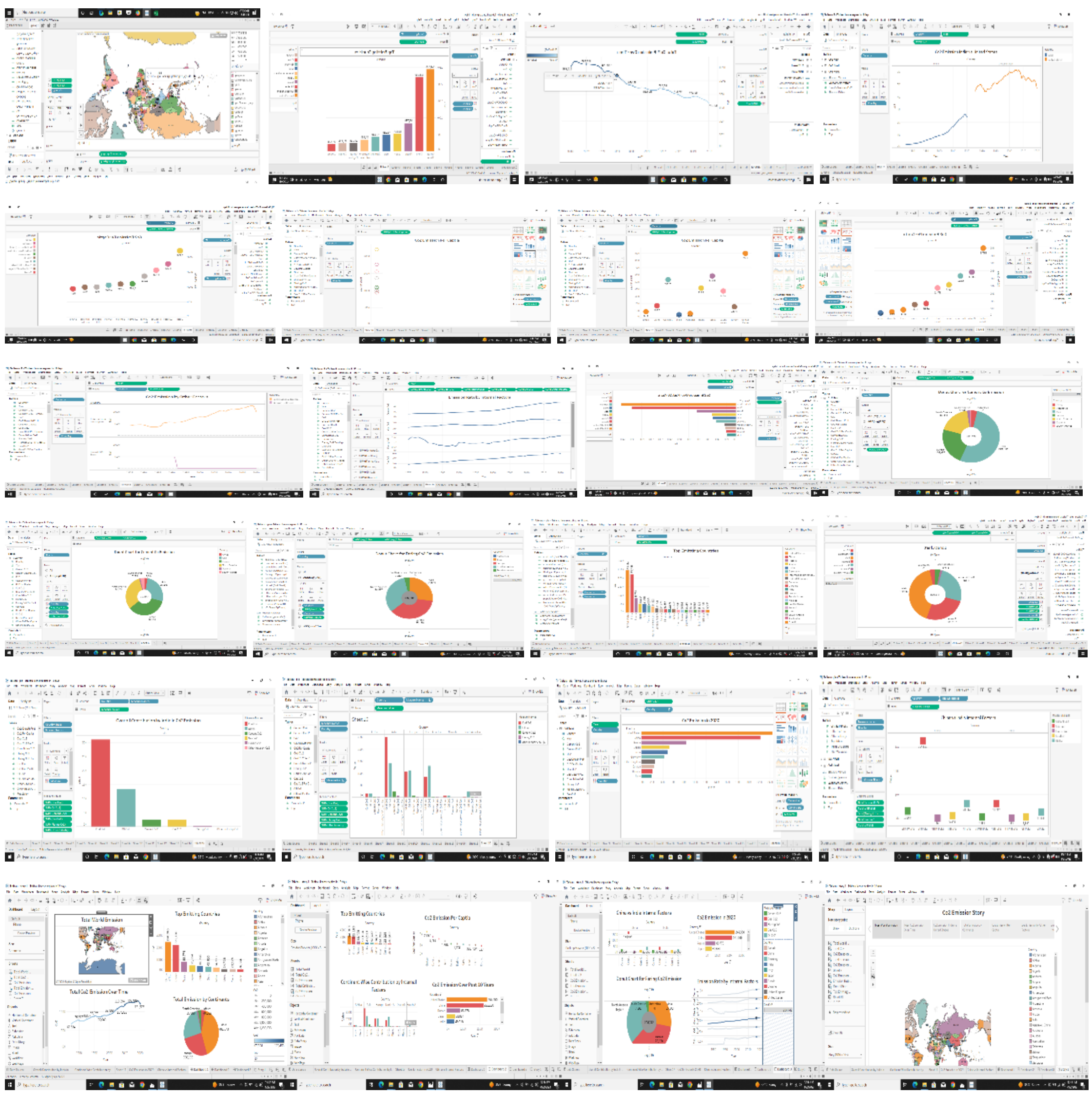
WHAT CAUSES THE INCREASE IN ATMOSPHERIC CARBON DIOXIDE?

Some hundred million years ago solar energy was stored in the form of organic compounds by photosynthesis. By combustion of fossil fuels this energy is released, mainly by the conversion of carbon into carbon dioxide Specific emissions range from 3 4 tons of carbon dioxide per ton of coal equivalent for lignite to 1.9 t CO_2/t of coal equivalent for natural gas They can be used to calculate total emissions. These emissions into the atmosphere are at present about 20 X 109 t CO_2 per year and the amount emitted since 1850 totals about 500 X 109 t of CO_2. The carbon dioxide in the atmosphere (about 2600 X 109 t) is continuously in exchange with the carbon stored in seawater (100 m surface layer stores about 840 X 109 t carbon, deep ocean water about 36 000 X 109 t carbon and 830 X 109 t in organic matter) and the carbon stored in biomass on land (about 1500 X 109 t carbon). Because of their respective molecular weights, 12 g of carbon are equivalent to 44 g of carbon dioxide. As about 50% of the emitted CO_2 remains in the atmosphere it is assumed that most of the balance is absorbed by the oceans. This has been confirmed by several calculations with models of the global carbon cycle. However, recent measurements of carbon-13 concentrations in tree-rings seem to indicate that in addition to these emissions from fossil fuel consumption an input of CO2 into the atmosphere might have occurred due to large scale deforestation These calculations are not very reliable, as only several trees have been measured, data on deforestation are only extrapolations from very limited areas and no process is known which could account for the additional uptake of CO2by the oceans which then must have occurred.

FUTURE LEVELS OF CARBON DIOXIDE

The model used here considers the global carbon cycle as outlined in the loop-structure of Figure 4. It has been tested against the historical data on the increase of CO2-concentration, the relative dilution of the carbon-14/carbon-12 isotope ratio (Suess effect), and the carbon-14 decrease in the atmosphere after the cessation of atmospheric bomb testing. Various future energy scenarios may then be used as input data to the model to calculate expected future carbon dioxide concentrations and resultant temperature changes with regard to those energy strategies. Let us consider two scenarios which would lead to a total primary energy consumption rate of 50 terawatts (50 000 000 MW) at the end of the next century. For a world population of 10 billion people, such a scenario would provide, on the average, about the per capita energy consumption of European countries. To get the orders of magnitude right, this figure may be compared to the ~ 8 terawatts (TW) we consume today.

2 RESULT



3 ADVANTAGES AND DISADVANTAGES:

Advantages of Co2 Emission:

The earth's atmosphere is approximately 0.039% carbon dioxide. This might not sound like an awful lot, but the finely-tuned balance of gases in our planet's atmosphere is what keeps the earth full of life (unlike all the other planets in our solar system).

Plants are especially reliant on CO_2, as they use it to get energy. Plants perform a chemical reaction known as photosynthesis which requires carbon dioxide - so, without it, we'd have no plants and thus nothing to eat!

Disadvantages of Co2 Emission:

There are several negative aspects of carbon dioxide:

For instance, did you know that if carbon dioxide levels reach higher than 5% in a room, this is usually enough to kill a human being?

Another threat that CO_2 poses comes in the form of global warming. Carbon emissions (partly due to the burning of fossil fuels) are causing a gap in our ozone layer.

The ozone layer is a 'film' around the earth that protects our planet from harmful rays coming from the sun. When holes appear in this layer, harmful rays enter the earth's atmosphere and raise the temperature of the planet.

This is known as the 'greenhouse effect', because it's similar to the reason why greenhouses get so hot.

The heating-up of the planet risks making it impossible to live on, and this can be seen as a threat that is directly related to CO_2.

5 APPLICATIONS:

The areas where the solution can be applied

We have launched the Change the Climate campaign in India. The aim is to tackle the effects of climate change, and help farmers restore biodiversity in farms while earning extra income.

Climate change is having an adverse effect on the people of India and its economy. A 2019 study by Stanford University showed that India's economy is 31 percent smaller than it would have been in the absence of global warming. At the forefront of these risks are farmers, in north Indian states such as Haryana and Punjab, crop yields will decline by 15 to 17 percent for every 2 degrees centigrade increase in temperature.

To combat some of these risks, the Indian Government aims to have around 33 percent of tree cover by 2030. At the end of 2019, tree cover stood at about 24 percent. Out of this, about 22 percent was from government-controlled forests, while around 2 percent came from acro-forestry - farming practices that incorporate trees among crops.

Our Change the Climate campaign aims to work towards making up for the remaining 9 percent of target forest cover and help farmers restore biodiversity in farms.

After detailed farm surveys, soil sampling and water testing, farmers are chosen and farms are readied for tree-planting. Tree species are chosen by scientists and progressive local farmers, while sowing and nurturing techniques follow scientific principles to ensure survival.

These trees will provide farmers with extra income, as well as restore biodiversity in their farms through a variety of trees -- timber, fruits, flower, herbs and shrubs. This extra income makes farmers resilient and more open to chemical-free farming, which is especially key to our work in Bhatinda, Punjab, which has been dubbed the cancer belt of India because of excessive chemical use.

6 CONCLUSITION:

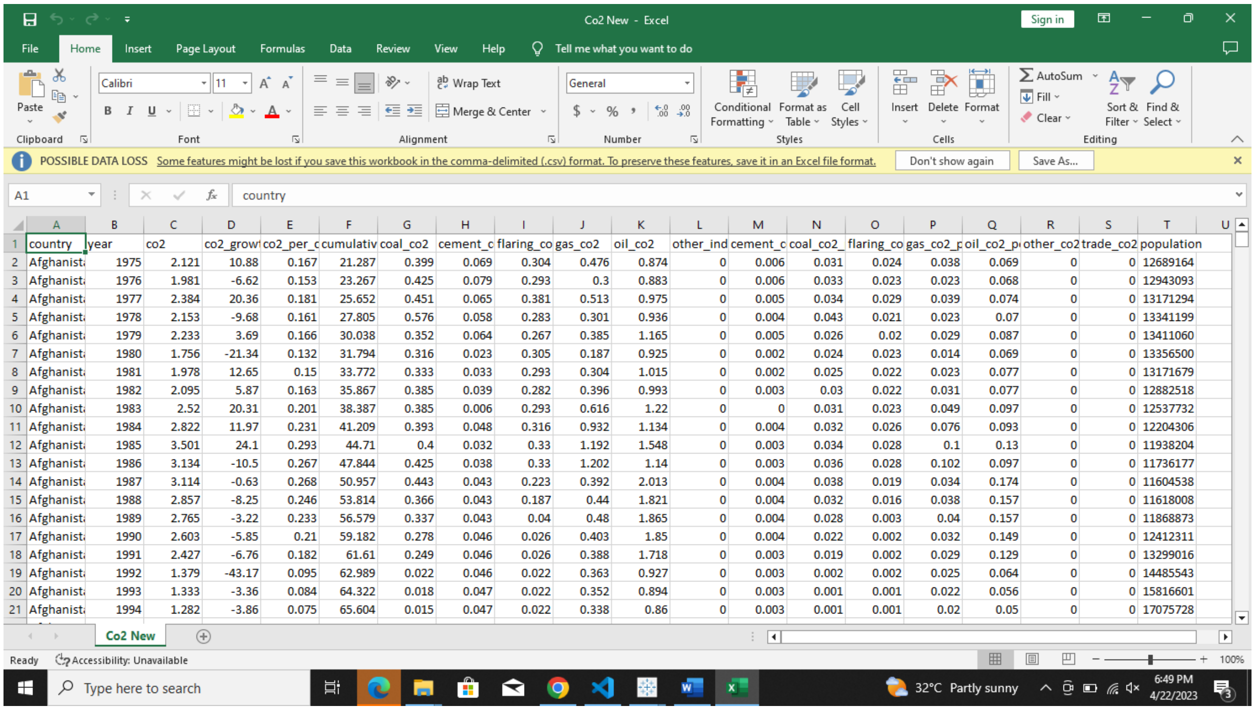
These calculations demonstrate the high potential risk of an increase of atmospheric CO2- concentration. At present, there seems to be no immediate need to reduce fossil fuel consumption. Much more research is needed to understand the carbon-13 data and to understand the possible impacts of climatic changes. Most scientists agree that mankind still has another decade to solve this problem on the other hand, there seems to be no reason to enhance fossil fuel consumption more than absolutely necessary It is not the intention of this article to provoke anxieties or fears, but rather to provide more of the information necessary for a rational decision on future energy supply. Such a decision should be based on a comparison of all the risks and benefits of alternative energy systems.

7 FUTURE SCOPE:

Global carbon dioxide emissions need to be reduced by 45 per cent by 2030 from 2010 levels, and reach net-zero emissions by 2050.

India's pledge to reach net-zero emissions by 2070 was one of the most important announcements at COP26. In line with the prime minister's statement, the federal government recently approved India's Updated Nationally Determined Contribution (NDC), which translates the COP26 announcements into enhanced climate targets.

8 APPENDIXES:



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
1	country	year	co2	co2_growt	co2_per_c	cumulativ	coal_co2	cement_c	flaring_co	gas_co2	oil_co2	other_ind	cement_c	coal_co2_	flaring_co	gas_co2_p	oil_co2_p	other_co2	trade_co2	population
2	Afghanist	1975	2.121	10.88	0.167	21.287	0.399	0.069	0.304	0.476	0.874	0	0.006	0.031	0.024	0.038	0.069	0	0	12689164
3	Afghanist	1976	1.981	-6.62	0.153	23.267	0.425	0.079	0.293	0.3	0.883	0	0.006	0.033	0.023	0.023	0.068	0	0	12943093
4	Afghanist	1977	2.384	20.36	0.181	25.652	0.451	0.065	0.381	0.513	0.975	0	0.005	0.034	0.029	0.039	0.074	0	0	13171294
5	Afghanist	1978	2.153	-9.68	0.161	27.805	0.576	0.058	0.283	0.301	0.936	0	0.004	0.043	0.021	0.023	0.07	0	0	13341199
6	Afghanist	1979	2.233	3.69	0.166	30.038	0.352	0.064	0.267	0.385	1.165	0	0.005	0.026	0.02	0.029	0.087	0	0	13411060
7	Afghanist	1980	1.756	-21.34	0.132	31.794	0.316	0.023	0.305	0.187	0.925	0	0.002	0.024	0.023	0.014	0.069	0	0	13356500
8	Afghanist	1981	1.978	12.65	0.15	33.772	0.333	0.033	0.293	0.304	1.015	0	0.002	0.025	0.022	0.023	0.077	0	0	13171679
9	Afghanist	1982	2.095	5.87	0.163	35.867	0.385	0.039	0.282	0.396	0.993	0	0.003	0.03	0.022	0.031	0.077	0	0	12882518
10	Afghanist	1983	2.52	20.31	0.201	38.387	0.385	0.006	0.293	0.616	1.22	0	0	0.031	0.023	0.049	0.097	0	0	12537732
11	Afghanist	1984	2.822	11.97	0.231	41.209	0.393	0.048	0.316	0.932	1.134	0	0.004	0.032	0.026	0.076	0.093	0	0	12204306
12	Afghanist	1985	3.501	24.1	0.293	44.71	0.4	0.032	0.33	1.192	1.548	0	0.003	0.034	0.028	0.1	0.13	0	0	11938204
13	Afghanist	1986	3.134	-10.5	0.267	47.844	0.425	0.038	0.33	1.202	1.14	0	0.003	0.036	0.028	0.102	0.097	0	0	11736177
14	Afghanist	1987	3.114	-0.63	0.268	50.957	0.443	0.043	0.223	0.392	2.013	0	0.004	0.038	0.019	0.034	0.174	0	0	11604538
15	Afghanist	1988	2.857	-8.25	0.246	53.814	0.366	0.043	0.187	0.44	1.821	0	0.004	0.032	0.016	0.038	0.157	0	0	11618008
16	Afghanist	1989	2.765	-3.22	0.233	56.579	0.337	0.043	0.04	0.48	1.865	0	0.004	0.028	0.003	0.04	0.157	0	0	11868873
17	Afghanist	1990	2.603	-5.85	0.21	59.182	0.278	0.046	0.026	0.403	1.85	0	0.004	0.022	0.002	0.032	0.149	0	0	12412311
18	Afghanist	1991	2.427	-6.76	0.182	61.61	0.249	0.046	0.026	0.388	1.718	0	0.003	0.019	0.002	0.029	0.129	0	0	13299016
19	Afghanist	1992	1.379	-43.17	0.095	62.989	0.022	0.046	0.022	0.363	0.927	0	0.003	0.002	0.002	0.025	0.064	0	0	14485543
20	Afghanist	1993	1.333	-3.36	0.084	64.322	0.018	0.047	0.022	0.352	0.894	0	0.003	0.001	0.001	0.022	0.056	0	0	15816601
21	Afghanist	1994	1.282	-3.86	0.075	65.604	0.015	0.047	0.022	0.338	0.86	0	0.003	0.001	0.001	0.02	0.05	0	0	17075728