

The Effect of increase of NO_x and CO_2 on Grain and Fish Production, Protection of Global Warming and Climate

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Received: November 15, 2018

Accepted: December 11, 2018

Published: December 20, 2018

Citation: Ozaki S. The Effect of increase of NO_x and CO_2 on Grain and Fish Production, Protection of Global Warming and Climate. *Int J Earth Sci Geol.* 2018; 1(1): 41-45. doi: 10.18689/ijeg-1000104

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Published by Madridge Publishers

Abstract

In order to study the reason why global warming is happening, the amounts of CO_2 emission, CO_2 concentration NO_x emission, grain production, fish production, population and CO_2 fix from 1900 to 2016 were studied.

Since the industrial revolution, burning of fossil and production of CO_2 and NO_x increased greatly, increased CO_2 and NO_x promoted the CO_2 assimilation and production of grain and fish increased. About 360 billion tone CO_2 is produced by burning of much fossil. About 14.4 billion tone NO_x is produced in 2015. Most of emitted CO_2 is fixed by CO_2 assimilation. But since developed country started NO_x elimination and NP elimination at around 1975, half of produced NO_x is eliminated. Therefore emitted 360 billion tone CO_2 is not fixed completely. Concentration of CO_2 increased about 2 ppm. In 2016, 142 billion tone CO_2 is remaining to give global warming. 142 billion tone CO_2 must be reduced. We must promote CO_2 assimilation by complete use of emitting NO_x and NP in waste water.

Fossil fuel is burning out soon. We should not spend precious fossil fuel for the elimination of NO_x and NP. We must increase CO_2 assimilation as much as possible.

Keywords: Global warming; Climate; CO_2 emission; Fossil fuel

Introduction

The Earth is warmed by the fossil fuel burning releasing CO_2 and heat. The plant is growing by CO_2 assimilation absorbing CO_2 producing carbohydrate and O_2 . If we can compensate the generation of CO_2 and heat with the absorption of CO_2 and heat by CO_2 assimilation, global warming can be protected [1-26].

CO_2 react with water and by CO_2 assimilation to produce carbohydrate and oxygen. Carbohydrate turns to cellulose, tree, plant and plankton. Tree turns to coal, plankton into oil in many billion years.

Our human being are using these fossil fuels and enjoying civilized life. Animal including fish can live by eating plant and plankton. Animal releases CO_2 by respiration. Released CO_2 react with water to give carbohydrate. CO_2 is cycling in such way shown in figure 1.

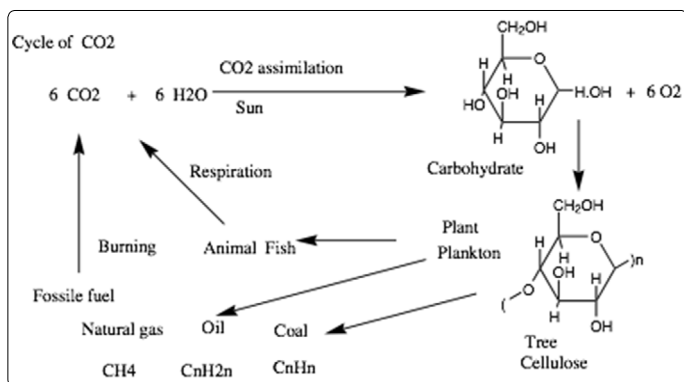


Figure 1. Cycle of CO₂.

CO₂ assimilation is accelerated by fertilizers like Nutrient nitrogen and Phosphorous. Nature set up the system to change Nitrogen gas to nutrient nitrogen, nitrogen oxide by the reaction of nitrogen with oxygen. The reaction needs high temperature. High temperature is obtained by burning of something like wood, fossil fuel or by thunder. By burning, CO₂ is produced and NO_x is also produced. The ratio of CO₂/NO_x is around 25/1. When 1 tone fossil is burned, 1 × 44/14=3.14 tone CO₂ is produced. 3.14 × 1/25=0.125 tone NO_x is produced.

When 140 billion tone fossil is burned. And 140 × 44/14=440 billion tone CO₂ is produced. And 440 × 1/25=17.6 billion tone NO_x is produced. By the increase of CO₂ and NO_x production, CO₂ assimilation is promoted greatly. I wish to describe the relation of global warming, CO₂ assimilation, production of grain, fish and showed the best method to protect global warming.

CO₂ Assimilation is promoted by Increase of CO₂ and NO_x

Since plant growth by CO₂ assimilation reaction, velocity of CO₂ assimilation is carried out in proportion to the concentration of CO₂, H₂O, Sunshine, Nutrient N, Nutrient P as shown by following equation.

$$v = A (CO_2) (H_2O) (\text{sunshine}) (N) (P)$$

Since the industrial revolution, burning of fossil and production of CO₂ and NO_x increased greatly. CO₂ emission, CO₂ concentration, NO_x emission, Grain production, Fish production, Population, CO₂ fix from 1990 to 2016 are shown in table 1.

Table 1. CO₂ emission, CO₂ concentration, NO_x emission, Grain production, Fish production, Population, CO₂ fix from 1990 to 2016.

| Year | CO ₂ em Bil t | CO ₂ con ppm | NO _x em Bil t | Grain Bil t | Fish Mil t | population Billion | CO ₂ fix Bil t |
|------|-----------------------------|----------------------------|-----------------------------|----------------|---------------|-----------------------|------------------------------|
| 1900 | 20 | 291 | 1 | | | 16 | 20 |
| 1920 | 30 | 303 | 1.2 | | | 20 | 30 |
| 1940 | 50 | 313 | 2 | | 20 | 25 | 50 |
| 1960 | 100 | 320 | 4 | 0.85 | 35 | 30 | 100 |
| 1980 | 200 | 350 | 8 | 1.5 | 55 | 45 | 120 |
| 1990 | 220 | 340 | 8.8 | 2.0 | 80 | 53 | 140 |
| 2000 | 250 | 340 | 10 | 2.2 | 130 | 61 | 160 |
| 2010 | 300 | 390 | 12 | 2.6 | 180 | 70 | 160 |
| 2016 | 360 | 400 | 14.4 | 2.8 | 200 | 75 | 220 |

Weight of vegetation of world increased about 2 times since the industrial revolution, area of tropical rain wood area increased very much since these several 10 years.

Total weight of wood is said to be 800 billion tones.

Professor Tadashi Watanabe [27] of Tokyo Science University tells the reason is the increase of CO₂. I think the reason is the increase of NO_x [1-26].

Zaichun Zou reported the change of global change of leaf area from 1982-2009. Total area of increased green is 18 million km², double of USA area [28]. The effects of CO₂ and NO_x on climate and plant growth are studied by many investigators [29-41].

The increase of CO₂ and NO_x production increased the CO₂ assimilation. The increase of CO₂ assimilation increased the production of grain and fish. The production of grain in 1960 was 0.85 billion tone whereas in 2010 was 2.6 billion tone which is 3 times higher [42,43].

The production of grain in India increased 5 times from 1950 to 2010. In 1950-0.5 billion tone, 1960-0.7 billion tone, 1970-1 billion tone, 1980-1.2 billion tone, 1990-1.7 billion tone, 2000-2.2 billion tone, 2010-2.5 billion tone, CO₂ emission is now 24 billion tone. NO_x emission increased to 1 billion tone. The increase of NO_x contributed for the production of 2.5 billion tone grain. Population of India increased 1951-3.8 billion to 2014-12.5 billion. 3.3 times grain production increased 5 times.

Fish production of the world increased. In 1940, 20 million tone, in 1960, 35 million tones, in 1980 45 million tone, in 1990 80 million tone, in 2000 130 million tone, in 2010 130 million tone, in 2016 200 million tone. China increased fish production 57 times from 1960 to 2017. In 1960 1.5 million tone, 1970 2 million tone, 1980-3 million tones, 1990-4 million tone, 1997-16.33 million tons, 2002-16.33 million tons, 2016-78.38 million tone, 2017-85.3 million tone. China produced 106 billion tones CO₂ and 4 billion tons NO_x. 4 billion tons NO_x contributed for the increase of nitrogen concentration of sea, and growth of plankton, increase of fish production [44].

China produced 4 billion tons NO_x. This NO_x increased nitrogen concentration of sea. East China sea in now top fishing sea. The three big fishing seas were North Pacific Ocean, North Atlantic Ocean, West of South America. These seas were rich in nutrient NP caused by countercurrent of deep sea water NP rich deep sea with NP poor surface sea water.

When CO₂ concentration increases, yield of grain increased about 30%. The concentration of CO₂ at green house is kept at 1000-1500 ppm. Normal concentration of air is 400 ppm. Therefore the concentration at green house is 2.5-3.75 times higher than normal air CO₂. The tree at population dense big city growth much rapidly than normal district.

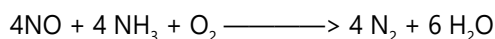
NO_x is very effective promotor of CO₂ assimilation. Therefore the production of grain and fish increased proportionally to the increase of CO₂ and NO_x. In 1900, 20 billion tone CO₂ is emitted and 20 billion tone CO₂ is fixed. In 1920 30 billion tone CO₂ is emitted and 30 billion tone CO₂ is fixed. In 1940 50 billion tone CO₂ is emitted and 50 billion

tone CO₂ is fixed. In 1960 100 billion tone CO₂ is emitted and 100 billion tone CO₂ is emitted and 100 billion tone CO₂ is fixed. After 1980, amount of CO₂ emission and fix become different. Fix amount become smaller than emission [45,46].

In 1980 200 billion tone CO₂ is emitted and 180 billion tone CO₂ is fixed. In 1990 220 billion tone CO₂ is emitted and 140 billion tone CO₂ is fixed. In 2000 250 billion tone CO₂ is emitted and 160 billion tone CO₂ is fixed. In 2010 300 billion tone CO₂ is emitted and 160 billion tone CO₂ is fixed. In 2016 360 billion tone CO₂ is emitted and 220 billion tone CO₂ is fixed. Amount of CO₂ fix is 140 billion tones less than emission. This is caused by the elimination of NO_x and NP. CO₂ assimilation is retarded by NO_x, NP elimination.

CO₂ Assimilation must be promoted by Stopping of NOx elimination and by Stopping of Waste water Purification [21]

In 2015 fossil 140 billion ton was burned and CO₂ 360 billion ton and NOx 14.4 billion ton are produced. If we use all NOx for the fixing of CO₂, we can fix 14.4 × 25 × 10⁸=360 billion tone CO₂. But NO_x is hated as pollution gas causing illness. Many governments of developed countries set up very strict law to eliminate NO_x in burned gas and forced to eliminate NO_x using ammonia. To eliminate NO_x, huge amount of ammonia is necessary and huge amount of fossil is burned.



Elimination of NO_x is promoting global warming three ways. One is retardation of CO₂ fix. Two is increase of CO₂ by using much butane. Three is consumption of precious fuel for the production of ammonia.

About 0.5 billion tone phosphorous and 10 billion tone nutrias nitrogen are contained in waste water. By using this phosphorous and nitrogen, 100 billion tone CO₂ can be fixed and 37.5 billion ton plankton can be produced and fish 1.5 billion ton can be produced. Animal eat food containing P and exclude excreta containing P. When toilet disposal and drainage are sent to excreta disposal treatment plant P in water was made to water insoluble mass, mixed with cement and made to concrete and buried in soil. Plant cannot use P any more [1]. This process use huge electricity and consume much fossil fuel. Around 10 billion tone fossil and producing 30 billion tone CO₂. For the elimination of one phosphorous, about 25 carbon fossil is used and about 25 CO₂ is produced. One phosphorous can fix 56 CO₂ [10]. The phosphorous and nitrogen elimination process should be avoided. Excreta is best food for plant. Ocean dumping, field dumping and forest dumping of excreta are recommended to increase CO₂ assimilation.

I wish to propose plan that NOx elimination should be stopped and waste water purification should be stopped. Then CO₂ assimilation is promoted and food production increase and global warming can be stopped.

Heat Balance of Earth [24]

On earth 140 billion tone fossil fuel is burned and CO₂ 3.6

× 10¹⁰ t was produced. And 7.4 × 10¹⁵ kcal is produced. When we consider the heat produced by animal respiration, 7.4 × 10¹⁵ kcal × 4.6/3.6=9.45 × 10¹⁵ kcal is produced.

The earth is also warmed by the heat of atomic energy. Uranium produces 2 × 10¹⁵ kcal heat. Electricity generation capacity of the world is 16868 Tetra watt h. Electricity generation by atomic energy is 2086 Tetra watt h. Therefore 7.4 × 10¹⁵ × 2986/ 10868=2.02 × 10¹⁵ kcal evolved by atomic energy.

The earth is also warmed by the heat evolved by animal. Human being eats 1000 kcal food every day and release heat 1000 kcal every day. Population of the world is 76 billion. Therefore human being is releasing 1000 × 365 × 76 × 10⁸=2.8 × 10¹⁵ kcal in one year. Animal other than human being, caw, bird, whales, seal are producing heat. We can estimate as same as human being 2.8 × 10¹⁵ kcal. Therefore total heat is fossil burning produce 7.4 × 10¹⁵ kcal, atomic energy produce 2.02 × 10¹⁵ kcal. Human being produces 2.8 × 10¹⁵ kcal. Other animal produce 2.8 × 10¹⁵ kcal.

Total heat produced is (7.4+2.02+2.8+2.8) × 10¹⁵=15.02 × 10¹⁵ kcal. We must absorb 15.02 × 10¹⁵ kcal by CO₂ assimilation.

CO₂ assimilation must be promoted by stopping of NOx elimination and by stopping waste water elimination. By stopping NOx elimination.14.4 billion tone NOx can fix 14.4 × 25=360 billion tone CO₂. Amount of N.P in drainage is around 10 billion tone. By using this 10 billion tone N.P, we can fix 10 × 25=250 billion tone CO₂. By adding 360+250=610 billion tone CO₂ can be fixed. And we can absorb 15 × 10¹⁵ kcal. And earth can be cooled down.

Electricity Generation by Solar System

Construction of solar mega system by the sacrifice of wood is not clever way. 1 hector, 1000 m² wood can absorb heat 3.8 × 10⁶ kcal and can fix 13.7 tone CO₂. Heat absorption efficiency of solar system cell is 1/3 of green leaf of tree. Solar system cell cannot fix CO₂. For the preparation of solar cell material, much fossil fuel is necessary generating almost same amount of CO₂ in compared with the generation of CO₂ and electricity by burning of fossil fuel. Therefore construction of solar mega system by the sacrifice of wood is promoting global warming.

1000 m² cell can generate 114000 kWh and can save 7.5 t CO₂ and can absorb 1.3 × 10⁶ kcal. For the production of 1000 m² cell 5 tone CO₂ is produced. Electricity generation should be done at no green land. The house located near wood, cooler is unnecessary. But the house located near solar mega system, cooler is necessary at summer.

Fossil Fuel is burned out soon

Table 2. Estimated amount of buried fossil; Billion tone.

| Fossil | Buried amount | Yearly use | Year |
|-------------|---------------|------------|------|
| Natural gas | 2769 | 46 | 60 |
| Oil | 1730 | 41 | 42 |
| Coal | 9090 | 75 | 121 |

When fossil is burned out, we need not worry about global warming. We must worry how we can live civilized life. How can we drive car, air plane, and agriculture machine? How can we generate electricity? How can we make plastic. We must save the consumption of fossil. We should not spend precious fossil for the elimination of NO_x, NP. We must depend on wood.

Electricity Generation should be done by Coal [18]

IPCC asking electricity generation by oil and natural gas than coal, because coals generate more CO₂ than oil. But I think coal is better for the generation of electricity to save the consumption of oil. The difference of CO₂ generation by both fuels is not so much different. CO₂ increase can be saved by the decrease of CO₂ emission by stopping NO_x elimination procedure. When we compare buried amount, coal (132 years) is 3 times as much as oil (42 years) and natural gas (60 years). We can manufacture many kind of chemical and plastic from oil. Oil is more convenient as transportation fuels. Therefore oil and natural gas are 3 times more precious than coal. Price of coal is 1/3 of oil. Therefore we can generate electricity by coal at low price. The price of electricity is very important for the competition of productive industry. The year of oil scare is coming in 50 years. Then we must do liquefaction of coal to get liquid fuel for transportation. In this process, about half energy of coal is lost. We can enjoy our civilized life longer by saving the consumption of oil and natural gas.

Summary

Global warming and fossil fuel burn out can be protected by the promotion of CO₂ assimilation by supply of nutrient N and P by following 8 items.

1. Elimination process of NO_x in power station, chemical station and iron work station should be stopped.
2. Elimination process of nutrient N and P in drainage should be stopped. Ocean dumping, field dumping and forest dumping of excreta are recommended.
3. Agitate deep sea water (rich in nutrient N and P) with shallow sea water (poor in nutrient N and P).
4. Promotion of food and wood production at as wider area as possible as we can.
5. Stop the unproductive uses of fossil fuel. Like war, auto race, leisure cruising, leisure trip.
6. Stop the unnecessary economic stimulus measures such as renewal of building and car and construction of unnecessary building, road and rail way.
7. Restriction rule of NO_xemission of car should be loosed.
8. Stop the construction of solar cell system by the sacrifice of wood.

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