

Following are some comments about the fourth question: "Could some of the stories in Genesis be flawed because of the 1,000 or more years that it took before they were written down?"

Dr. F: On your fourth question, all stories in all cultures and all times get somewhat "flawed" in telling/retelling particularly in an oral tradition phase. But that should not encourage you to think that they necessarily reflect the truth. Good luck with your progress.

Dr. G: The Mesopotamia parallels suggest that the biblical story did not evolve over 1,000 years but was borrowed a relatively late period [late pre-exile or early exile] from the Babylonians.


Dr. H: The stories are not flawed in their historical situations and intention.

Dr. I: I think transmission of the biblical text was accurate in essential points so that is not the solution to the problem ... a solution might lie along the lines of what "worldwide" meant to the then known world of the storyteller.

Dr. J: I don't accept the premises established by the question. I'm not convinced the Genesis material requires a 1,000 year oral tradition, but I also don't believe the Genesis account is "Flawed." The textual evidence of Genesis 6-9 can be legitimately read any of several ways. The original meaning could have been either (1) a universal flood, implied by "the face (or surface) of the earth" (Gen. 7:4), or (2) a local flood, implied by some of the Hebrew terms used, such as "earth" which can mean simply "Land, country" ... Likewise the scientific and geological evidence is not conclusive. I believe the flood was a real, historical account. We can only conclude that the flood waters covered the inhabited land (Gen. 6:7).

Conclusion

Twenty-six responses are perhaps not enough to draw a completely valid conclusion, but I think it is significant that 100% of those answering the questions have never found any evidence of a literal worldwide Genesis flood in any historical time period up to 10,000 years ago. Also, 100% of those who only commented on the questions never indicated that they had found any evidence of a literal worldwide Genesis flood either.

So whatever we may decide about the nature of the biblical flood account, the *Harper's Bible Dictionary* is apparently correct when it says, "Despite numerous attempts to find archaeological evidence for a universal deluge, one has not been found ..." 

Notes

¹www.hum.huji.ac.il/archaeology.golan

²Josef Garfinkel, *The Yarmukians* (Bible Land Museum, 1999).

The World's Oil Supply Revisited



Glenn Morton, ASA Member, Apartment A505, 50 Liangmaqiao Road, Chaoyang District, Beijing 100016 PRC.
glennmorton@entouch.net

In the years since I first published on this,¹ there have been an increasing number of people becoming aware of the potential difficulties the world will soon face with oil supply. In my previous article, it was noted that many experts were saying the world would soon face perpetually declining oil production rates. By the end of this century, there will be no commercial quantities of oil as we have today. The big argument has been over when the production rate will peak and begin to decline.

At the time I wrote the last piece on this topic (July 2000), oil production in many countries was thought to be stable. But December 1999 was the peak of Great Britain's oil production. Since then production in many of the world's major oil supplying countries has plummeted. Britain has become a net oil importer this year, and the government expects to see a 20% decline in the pound due to this event.² Oman was producing 960,000 barrels per day (bbl/d) in 2000 but they are hoping not to go below 650,000 bbl/d in 2004.³ Indonesia's production has dropped 17% since then.⁴ Since the world's production is the sum of the individual country's production, the decline in major suppliers is worrisome.

In 2000, we produced 71% of the world's oil from countries whose production is post-peak. By 2002, just two years later, that had increased to 75.3%. Exploration success continues to decline with the oil industry finding one barrel of oil for every nine it produces.⁵ In 2012, the world will produce 50% of its oil from old worn out fields producing small quantities per field.

The immanent decline in oil production was highlighted during 2004 by special sections devoted to the issue at conventions of the Society of Petroleum Engineers, the Offshore Technology Conference, the Society of Exploration Geophysicists, and by a conference on reservoir management I attended. The industry knows that we no longer will be able to fuel the world.

The concerns are summed up in a simple mathematical relationship. Today, the world produces 80 million barrels per day (mmbbl/d). By 2020, the present fields will only

News & Views

The World's Oil Supply Revisited

produce 40 mmbbl/d due to the normal decline in production rate. But demand will be 120 mmbbl/d.⁶ In the next sixteen years, the oil industry must place on stream as much oil as we are producing today, 80 mmbbl/d of new production (Figure 1). No one I know in the industry believes this is possible. Total hydrocarbon supply shows the same issue.⁷

The deepwater has been the great hope for the oil industry. But the deepwater discovery rate peaked in 1996 and it is falling.⁸ Reports say only 150 billion barrels of recoverable oil are in the deepwater.⁹ Eighty billion has already been discovered with 20 billion put on production. The world burns 27 billion barrels of oil per year, the deepwater only represent 5.5 years of world oil supply.

During the twentieth century, oil fields lasted 10–60 years, while production gradually declined. The physics of fluid flow and the small holes through which oil entered a well bore on its way to market limited how fast oil could be extracted. But new techniques of completing oil wells has vastly increased the flow rate. A century ago, 400 bbl/day was considered a good oil well. Today we have wells initially producing 45,000 bbl/day. At those rates the field is drained quickly. This technology has put the energy suppliers on a treadmill which gets faster with each passing year. Our ability to keep up is on the verge of collapsing.

In 2004, Saudi Aramco published for the first time a reservoir model of Ghawar.¹⁰ Ghawar is the largest field in the world and produces 6% of the world's oil. Today,

the oil column at Ghawar is less than 150 feet thick, compared to the original 1,300 foot thickness. Engineers who have worked Ghawar, say that reservoir models indicate an imminent collapse in production by 2008 to 2009.¹¹ The reservoir model shows that the engineers are correct. The oil in the model divided by the production rate indicates that there are only a few years left in the largest field in the world. Reports suggest Ghawar production is now declining at 8% per year.¹²

What is more disturbing is that Saudi Arabia is the leading purchaser of electric submersible pumps.¹³ These pumps move fluid up the well faster. It is a sign that the natural flow of the rock is dropping and the amount of water production is increasing. When these conditions occur, to keep the amount of oil extracted constant, one simply moves more fluid up the borehole. Where this technology has been applied, it inevitably leads to future precipitous drops in oil production.¹⁴

Matthew Simmons, an energy investment banker and recognized authority on world production, has warned the world of the upcoming Saudi problem.¹⁵ The Saudi's have responded by saying that they could increase their production by 50% and keep it there for fifty years. But to do that will require them to produce more oil than they have in reserves.¹⁶ With the problems at Ghawar, this will be impossible.

What will happen? Energy demand will continue to increase.¹⁷ In the short term, natural gas will be liquified and moved from country to country. There are huge

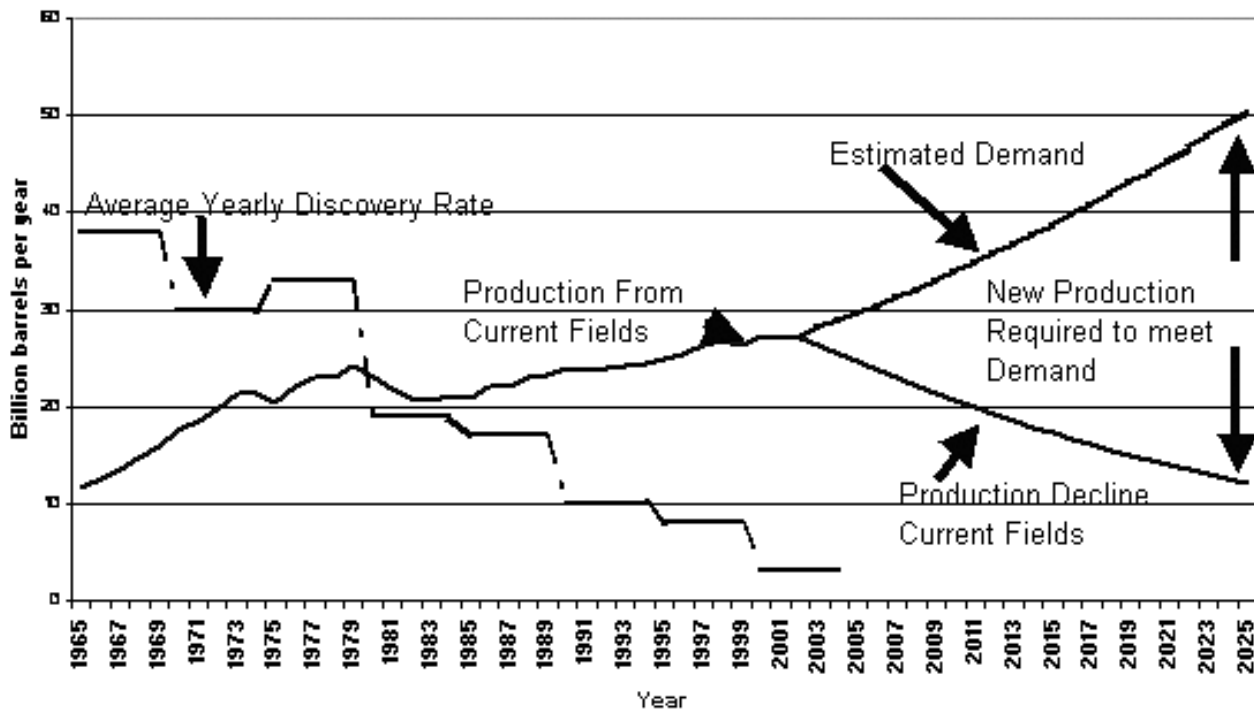


Figure 1. Discovery Rate, Production Rate, Future Demand. Data from various sources referenced in this paper.

stranded natural gas reserves in Siberia and the Middle East.¹⁸ But moving them to market requires huge investments. Coal use will also increase.¹⁹ The world is said to have a two hundred year supply of coal. That will not be the case. As oil declines, coal usage must increase five-fold. A two hundred year supply is suddenly a forty year supply.

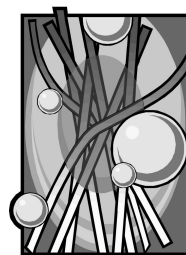
In the next few years, the world will face a severe oil shortage and substitutes are not identified. This is why the oil price has risen from \$20/bbl to \$45+/bbl in two years. We depend upon energy to provide us with potable water. We depend on it to make fertilizer, without which crop yields will fall. We depend upon it for transportation to move that food to us. A world with a perpetually falling oil production, which some say will begin in 2005,²⁰ will be a very different place technologically, calorically and politically. Countries like Russia, which have energy, will hold sway over those that soon will not—like Britain.

Literally this is a problem of feeding the hungry and bringing peace. What can we do? We need to commercialize hydrogen fusion. In 1% of the world's deuterium is 500 thousand times more energy than will be burned in all the fossil fuels combined.²¹ But there is no sense of urgency among the governments of the world to solve this problem. There should be. ✂

Notes

- ¹G. R. Morton, "The Coming Energy Crisis," *Perspectives on Science and Christian Faith* 52, no. 4 (2000): 228.
- ²"Energy Drag 'Could wipe 20% off Pound,'" *Evening Standard*, Feb. 23, 2004, 34.
- ³Nassir Shirkhani, *Upstream* (Dec. 19, 2003): 8 and *BP Statistical Review of World Energy* (June 2003).
- ⁴*BP Statistical Review of World Energy*.
- ⁵Chip Cummins, "Data Cast Doubt on Oil Discoveries," *Wall Street Journal*, January 23, 2004, p. A2.
- ⁶It is not just charts and rumors at an oil industry conference which support such a pessimistic view of oil's future. See Jacqueline Dougherty, "Half Empty?" *Barron's* (March 15, 2004): 19, which says that we will need to place on stream 39 million barrels per day of new capacity by 2010.
- ⁷Rex Tillerson, President ExxonMobil (Dec. 8, 2004). www.tipro.org/TIPRO-Web/ppt/TillersonPresentation.ppt Meeting the Challenge accessed 1-9-05; James R. Katzer, Strategic Planner at Exxon-Mobil Research gives similar numbers, 110 million barrels per day demand in 2020. www.cosmos-club.org/journals/2002/katzer.html
- ⁸Ivan Sandra, "Deepwater Oil Discovery Rate May Have Peaked; Production Peak May Follow in 10 Years," *Oil and Gas Journal* (July 26, 2004): 20.
- ⁹Darius Snieckus, "Deepwater Technology Struggles to Catch Up," *Offshore Engineer* (Dec. 2003): www.oilonline.com/news/features/oe/20031203.Deepwate.12992.asp
- ¹⁰Shiv N. Dasgupta, "Reservoir Monitoring with Permanent Borehole Seismic Sensors: Ghawar Field Arab-D Reservoir," *74th Annual SEG International Exposition Expanded Abstracts II* (2004): 2247-50.
- ¹¹Personal Communication, March 2004. For fear of hurting these men's careers, names will be withheld.
- ¹²Matt Simmons, "Saudi Arabia in Crisis," Hudson Institute (July 9, 2004): www.globalpublicmedia.com/transcripts/222.
- ¹³Sandra, "Deepwater Oil Discovery Rate May Have Peaked."

- ¹⁴Jeff Gerth, "Forecast of Rising Oil Demand Challenges Tired Saudi Fields," *New York Times*, February 24, 2004, final edition, sec. A, p. 1.
- ¹⁵www.simmonsco-intl.com/files/Kuwait%20Talk.pdf
- ¹⁶Shirkhani, *Upstream*.
- ¹⁷David J. O'Reilly, Chairman of ChevronTexaco, "The New Energy Equation," *World Energy* 7, no. 3 (2004): 28.
- ¹⁸www.ingexpress.com/Ingrev/intro_sglocs.asp. 450 trillion cubic feet is equivalent to 81 billion barrels of oil on an energy equivalent basis. That is a three-year replacement of the energy from oil.
- ¹⁹Rebecca Smith, "After Long Taking its Lumps, Coal Is Suddenly Hot Again," *Wall Street Journal*, April 1, 2004, p. 1.
- ²⁰Kenneth Deffeyes, personal communication, Oct. 29, 2004.
- ²¹David Price, "Energy and Human Evolution," *Population and Environment: A Journal of Interdisciplinary Studies* 6, no. 4 (March 1995): 301-19. www.oilcrash.com/articles/energy.htm



Challenge of the Tangles: Re-evaluating Concepts of Life's Origins

Wayne Frair, ASA Member, 1131 Fellowship Road, Basking Ridge, NJ 07920-3900. frair@sprynet.com

The current Chairman of the ASA's Commission on Creation, Robert C. Newman, has unfolded some persistent problems for holding a macroevolutionary view for origins of life.¹ In opposition to this, ASA Advisory Council Member Francis S. Collins has expressed his support for evolution,² a concept commonly conceived as a "tree of life." Now the explosion of new knowledge about the complexity of life has led to new challenges:

Yet ill winds are blowing. To everyone's surprise, discoveries made in the past few years have begun to cast serious doubt on some aspects of the tree, especially on the depiction of the relationships near the root.³

Lateral gene transfer has uprooted a single-trunked tree of life. The roots are tangled and so are the branches.⁴

Jennifer A. Marshall Graves has extended the analogy two steps further to include a tangle of the "twigs" of the tree of life and the obscuring nature of the leaves. The increasing understanding of so-called "junk" nucleic acids is adding to the complexity of present problems (see Figure 1). Graves bequeaths to future generations the problems of untangling evolutionary complexity. She further prophesies that evolution not only will be used to answer the "how does it work" questions but also "those of ultimate concern to humans," namely the "why" questions.⁵

Evolutionary difficulties are recognized in many fields. "The fossil record of avian evolution [is] ... a tangled wing."⁶ See R. H. Thomas for arthropod controversies.⁷ Genomic comparisons of apes and humans may not be