ISSN: P-2455-0515
E- 2394-8450

Educreator Research Journal

OPEN ACCESS

VOLUME–XI, ISSUE–III

MAY – JUNE 2024

Original Research Article

UNRAVELING THE NPA CRISIS: A DEEP DIVE INTO COOPERATIVE BANKING CONCERNS

*** Ms. Divya Rajiv Khurana**

* M. Com., A.C.S., UGC NET, Research Scholar

Abstract:

A Bank, in fact is just like a heart in the economic structure and the capital provided by it is like blood in it. Banks play a very important role in the economic life of nations. The banking sector in India is passing through tough competition and has undergone tremendous change. In India, the Financial Sector Reforms was started in 1992. Across the globe, the Banking sector acts as the catalyst for each country's economy. Banks face several risks in conducting their business, and how well these risks are understood and managed is a key driver behind profitability. A banker is very cautious while lending because he is not lending money out of his capital. A major portion of the money lent, comes from the deposits received from the public and these deposits are mostly repayable on demand.

This paper also traces the menace in Non-Performing Assets of financial cooperatives in other countries. The rise in NPAs has become the burning issue and the threatening factor to the banking institutions in general and Cooperative Banking System in particular. Increasing trend in NPAs of Cooperative Banks had become a major cause of concern. During the year 2003-04, two-fold increase in NPAs was noticed at the SCBs level due to the low recovery in lower tiers. Banks, at present, experience considerable difficulties in recoveries of loans and enforcement of security charged to them. A proper sequencing of the reforms is essential to its success and what is more important is the internal management practice prevailing in the Banking industries to manage the Non-Performing Assets portfolio.

Keywords: *Non Performing Assets (NPA) , UCBs, Cooperative Banks*

Introduction:

Banks are called the backbone of economies. It has been playing a very important role in the economic development of all the nations of the world. Banks play an important role in the economic development of a country. "Banking" means the accepting, for the purpose of lending or investment, of deposits of money from the public, repayable on demand or otherwise, and withdrawal by cheque, draft, or otherwise. Banks play an important role in the economic development of a country. Banks are growth-drivers and the banking business is exposed to various risks, such as credit risk, liquidity risk, interest risk, market risk, operational risk and management risk. Among the myriad risks faced by Banks, one of the most important risks is the Credit risk. Credit risk refers to the risk that a borrower will default on any type of debt by failing to make required payments. The risk is primarily that of the lender and includes lost principal and interest, disruption to cash flows, and increased collection costs.

1. **Indian Banking System:** In India the first bank was established in 1809 i.e. Bank of Bengal. In India the first bank was established in 1809 i.e. Bank of Bengal. During the period 1809 to 1905 a number of banks were founded but the directors of the banks were hardly, knowledgeable and experienced. Moreover, the staff

ISSN: P-2455-0515
E- 2394-8450

Educreator Research Journal

VOLUME–XI, ISSUE–III MAY – JUNE 2024

Original Research Article

of the banks were neither experienced nor trained. In the period of 1906 to 1917, called Swadeshi Movement, a number of banks with Indian management were established, but banking had not improved in the past. The banking crises of 1913-1917 about 87 banks failed with total paid-up capital of more than half of those survived. After the II World War there was a rapid expansion of commercial banks, but it was not free from defects. There were so many drawbacks, so due to these reasons nearly 474 banks failed between 1939 and 1947.

2. Financial Structure of Indian Banks chart:

Table 1:

The financial structure of Indian banks typically involves various components that outline their operations and capital structure.

Component	**Description**
Capital	Represents the funds contributed by shareholders and retained earnings.
Reserves & Surplus	Accumulated profits and other reserves that bolster the bank's financial base.
Deposits	Primary source of funds, including savings, current, and fixed deposits.
Borrowings	Funds borrowed from other banks or financial institutions.
Investments	Includes investments in government securities, bonds, and other financial assets.
Advances	Loans provided to customers, including corporate, retail, and agricultural loans.
Other Liabilities & Provisions	Includes provisions for bad debts, employee benefits, and other liabilities.
Fixed Assets	Property, equipment, and other fixed assets owned by the bank.
Miscellaneous Expenditure	Includes preliminary expenses, goodwill, and other intangible assets.

NPA means assets, which ceases to generate income for a bank. High level of NPAs is an indication of poor credit management. The Committee on Banking Sector Reforms (1998) rightly pointed out the funds locked up in NPAs are not available for productive use or recycling (GOI: 1998,p.12)

Father of cooperative movement Robert Owen believed in putting his workers in a good environment with access to education for the society. His Social reform work, socialism and the cooperative movement was influenced over the universal. Co-operative institutions build a better world in this connection Indian economic system tries to indicate that during the five plans emphasis are given for reasonable income distribution resulting into minimization of monopolies.

It clearly explained by IMF that the role of banking sector is considered vital as banking service is backbone of the financial system. The risks to financial stability continued to remain at elevated levels, with growth witnessing a delicate and multiple pattern of recovery. Non-Performing Assets (NPA) are one of the major concerns for Indian banking. NPA is adversely affecting not only the financial performance of the banking sector but also the Indian Economy.(Ramrao, Revati,Anjali 2008). Banks are required to furnish a Report on NPAs as on 31st Mach each year after completion of audit.

3. **Concept of Co-Operative:** A co-operative Society is an association of persons came together voluntarily to meet their common economic, social, and cultural needs and aspirations through a jointly created and owned enterprise. Co-operative banks are an assembly of financial organizations organized under the provisions of the cooperative society's act of the states. A co-operative is an autonomous association of persons united voluntarily to meet their common economic, social and cultural needs and ambitions through a jointly owned and constitutionally enterprise. Common co-operation leads to co-operatives. Co-operative banks are voluntary organizations, which are open to all persons who are able to use their services and willing to accept their responsibilities such as membership, without religious discrimination.

   Co-operative banks have completed 100 years of existence in India. They play a very important role in the financial system. The co- operative banks in India form an integral part of our money market today. Therefore, a brief resume of their development should be taken into account. The history of co- operative banks goes back to the year 1904. In this year the co-operative credit society act was enacted to encourage cooperative movement in India. But the development of co- operative banks from 1904 to 1951 was the most disappointing one. It indicates as compare to international cooperatives India cooperative movement was very minute.
4. **Non-Performing Assets Concepts:** The banking assets, as such, may form a category yielding returns or these may relate to a segment not generating any revenue. In the latter case, a section of such assets may fall into sub-category known as non-performing assets. A Non-Performing Asset in banking parlance was termed for an asset not contributing to the income of the bank. In other words, it was a Zero-yield asset, where even the recovery of principal was not to take effect in normal course without extra efforts and/or drastic actions.
5. **Types of Non-Performing Assets:** The non-performing asset (NPAs) has been classified into following two types. a. Gross NPA Gross NPA is the total number of NPAs of the bank simply added together. Gross NPA is advance, which is considered irrecoverable, for which bank has made provisions, and which is still held in banks 'books of account. b. Net NPA Net NPA is simply the total bad assets (actual) minus the provision left aside.Net NPA is obtained by deducting items like interest due but not recovered, part payment received and kept in suspense account from Gross NPA.

Table 2 : Different types of non-performing assets:

Category	**Description**	**Timeframe**	**Recovery Potential**	**Example**
Sub-standard Asset	An NPA that is overdue for a period less than or equal to 12 months.	Up to 1 year	Relatively high	A loan payment that is 3 months overdue.
Doubtful Asset	An asset that has remained an NPA for more than 12 months.	More than 1 year	Uncertain	A loan payment that is 18 months overdue.
Loss Asset	An NPA that is considered unrecoverable or has minimal value.	More than 3 years	Low or nil	A loan that has been defaulted on for several years and the collateral is

ISSN: P-2455-0515
E- 2394-8450

Educreator Research Journal

OPEN ACCESS

VOLUME–XI, ISSUE–III

MAY – JUNE 2024

Original Research Article

				insufficient to cover the loss.
Sub-standard Asset	An NPA that is overdue for a period less than or equal to 12 months.	Up to 1 year	Relatively high	A loan payment that is 3 months overdue.
Doubtful Asset	An asset that has remained an NPA for more than 12 months.	More than 1 year	Uncertain	A loan payment that is 18 months overdue.

6. **NPAS And Banking Institutions In India**

The NPA concept introduced by the Reserve Bank in the year 1992 is the outcome of the Narsimham Committee recommendations on financial sector reforms. Inordinate delay in recovery of loans and advances builds up NPAs, which affect Banking Institutions adversely with respect to liquidity and impair their ability to render service to the maturing liabilities. The funds blocked in NPAs increase the cost of financial intermediation as Banking Institutions resort to raising deposits and borrowings at a high cost as a measure to minimize the imbalance between cash outflow and cash inflow. This has an adverse impact on the profitability of the banks both in the short and long run. The monies locked up in NPAs are not available for productive use and to the extent the banks seek to make provisions for NPAs or write them off, which claims share in their profits. To recover the same, banks have to charge their honest, diligent and productive customers a higher rate of interest. It thus becomes a tax on efficiency. The customer who use credit efficiently, subsidies those who use credit inefficiently, represented by NPAs.

Table 3 : Provision Required To Be Made

Outstanding balance	Rs. 4.00 lakhs
Less: Value of security held Rs.	1.50 lakhs
Unrealised balance	Rs. 2.50 lakhs
Less: DICGC Cover (50% of unrealizable balance)	Rs. 1.25 lakhs
Net unsecured portion of advance	Rs. 1.25 lakhs
Provision for unsecured portion of advance	Rs. 1.25 lakhs @100 percent of unsecured portion)
Provision for secured portion of advance	Rs. 0.75 lakhs @ 50 percent of secured portion)
Total provision required to be made	Rs. 2.00 lakhs

A NPA need to go through the various stages of classification in cases of serious credit impairment and such assets should be straightaway classified as doubtful or loss asset as appropriate. Erosion in the value of security can be reckoned as significant when the realizable value of the security is less than 50 per cent of the value assessed by the bank or accepted by RBI at the time of last inspection, as the case may be. Such NPAs may be straightaway classified under doubtful category and provisioning are to be made as applicable to doubtful assets.

7. **Floating Provisions:** Some of the banks make a 'floating provision' over and above the specific provisions made in respect of accounts identified as NPAs. The floating provisions, wherever available, could be set-off

against provisions required to be made as per above stated provisioning guidelines. Considering that higher loan loss provisioning ads to the overall financial strength of the banks and the stability of the financial sector, banks are urged to voluntarily set apart provisions much above the minimum prudential levels as a desirable practice.

8. **Factors Causing NPA:** There are several factors responsible to make an asset NPA. These factors broadly classified into the following two: I-External factors II- Internal factors.

External Factors:

External factors are the factors where owner has no control over them. These factors are discussed in the following lines: Ineffective Recovery Tribunal, Willful Defaults, Natural Calamities, Industrial Sickness, Lack of Demand Change in Government Policies, Liberalization of Economy/Removal of Restrictions/Reduction of Tariffs ,Lax Monitoring of Credits and Failure to Recognize Early Warning Signals, Over Optimistic Promoters, Directed lending, Highly Leveraged Borrowers, Funding Mismatch, High Cost of Funds, Sluggish legal system, Scarcity of raw material, power and other resources. Industrial recession, Shortage of raw material, raw material\input price escalation, power shortage, industrial recession, excess capacity, natural calamities like floods, accidents Failures, non-payment over dues in other countries, recession in other countries, externalization problems, adverse exchange rates etc., Government policies like excise duty changes, Import duty changes etc ,Recession Input/power shortage, Price escalation Exchange rate fluctuation, Accidents and natural calamities unwillingness to pay leads to NPA domestic problems like death, divorce, illness and marriage of family members Financial problems of the party ,Wrong identification of Inaccurate pre sanction security and appraisal of loan Target oriented approach to lending by banks, Absence of credit information sharing among different financial institutions, Weak monitoring leads to NPA in repayment of loan, Inadequate laws to take appropriate action, Unnecessary Political intervention these are the external factors affecting on NPA.

Internal Factors: Other than, the external factors mentioned above, there are various internal factors that cause for transforming an asset into the NPA.

These factors are outlined below:

Defective Lending Process, Inappropriate Technology, Improper SWOT Analysis, Managerial Deficiencies, Absence of Regular Industrial Visit, Faulty Credit Management .

Apart from these the other internal factors are:-

Funds borrowed for a particular purpose but not used for the said purpose, Project not completed in time, Poor recovery of receivables, Excess capacities created on non-economic costs, In-ability of the corporate to raise capital through the issue of equity or other debt instrument from capital markets, Business failures Diversion of funds for expansion\modernization\setting up new projects\ helping or promoting sister concerns. Willful defaults, siphoning of funds, fraud, disputes, management disputes, misappropriation etc Deficiencies on the part of the banks viz. in credit appraisal, monitoring and follow-ups, delay in settlement of payments\ subsidiaries by government bodies etc.

ISSN: P-2455-0515
E- 2394-8450

Educreator Research Journal

OPEN ACCESS

VOLUME–XI, ISSUE–III MAY – JUNE 2024

Original Research Article

9. **Non Performing Assets :** The Committee on the Financial System (1991) believed that a proper system of income recognition, assets classification and provisioning was fundamental to the preservation of the strength and stability of the banking system (GOI: 1991,p.54).

   In international scenario NPA in banking sector is a prominent issue dominating the soundness, stability, profitability and solvency of the banking institutions.

Objectives of the Study: The study contains the following objectives.

1. To study Non-performing Assets (NPA) in Indian Banking System
2. To find Remedial Measures for Controlling NPAs in Indian Banking System
3. To find the External & Internal factors influencing on NPA in Indian Banking System

Need of the Study: It has become necessary to maintain international standards in accounting practices of banks, Hence, the need for introduction of prudential norms in cooperative banks so as to understand their true financial health, the developments world over is analyzed hereunder. During the 100 years, the movement enters several sectors like credit banking, processing, housing, irrigation, transport, and even industries. But it is become of the credit co-operatives that it was possible to weaken the strong hold of moneylenders on thousands of poor families and free from their bondage

Research Methodology: Looking into requirements of the purposes of the research paper the research design employed for the study is of descriptive type. The secondary available data has been substantially used for the study. The various news articles, Books and Websites have been observed and used which are enumerated and recorded. Though several research studies on NPA in Indian banking sector are available, the studies on a closer look validated NPA problem using secondary data. This research largely is descriptive in nature.

Statement of the Problem: NPAs, as a syndrome, though not new to the Cooperative Banking Structure, had been causing trouble and confusion during the recent past. Because, NPAs as the percentage to total recoverable funds acted as a constraint on the efficiency of the lending institution and their capacity to borrow funds and lend to agriculture and rural development. At all India level, the total loan issued by District Central Cooperative Banks (DCCBs) during the year 1950-51 was Rs. 83 crore (Sinha, S.K: 1998, p. 119).

The Committee on Banking Sector Reforms reported that funds blocked in NPAs increase the cost of financial intermediation as banks resort to raising deposits and borrowings at a higher cost (GOI: 1998, p.35). This has an adverse impact on the profitability of the banks both in short and long run. So, Reserve Bank of India (1999) in its report on NPAs stated that reduction in NPAs should be treated as a national priority (www.rbi.org.in).

Review of Literature: The nature and extent of NPAs in Indian Banks in general and Cooperative Bank in particular have attracted considerable research attention during the past. The research studies conducted by the Government of India, RBI, NABARD, State Governments and individual researchers have covered various dimensions of causes and impact of NPAs. Some of these studies are reviewed here under in two broad categories viz., Overdue and Non-Performing Assets.

Shraddha, Kokane. & Shriram, Nerlekar. (2017) in the title "Recapitalization of Public Sector Banks - Will it reduce the Nonperforming Asset" analyzed the relationship between the Non-Performing Asset levels of public

ISSN: P-2455-0515
E- 2394-8450

Educreator Research Journal

OPEN ACCESS

VOLUME–XI, ISSUE–III

MAY – JUNE 2024

Original Research Article

sector banks with Capital Adequacy Ratio of each bank over a period of time.

Hosmani and Hudagi (2011) Non-Performing Assets- A study with reference to Public Sector Banks in India. Concluded that there is a marginal improvement in asset quality reflected by decline in the diverse NPA percentage. Even then, the quantum of NPAs is alarming with public sector in India.

Sudarsana Reddy, G. (2004, p.19) indicated that the percentage of standard assets to total advances of public sector banks increased from 84.1 per cent in 1999 to 88.9 per cent by the end of the year 2003, indicating that banks had succeeded in reducing NPAs, and reducing sub-standard assets.

Pagaria M.L & Ram Jass Yadev (2002. p.27) in their study revealed that the share of NPAs in loans and advances under Government sponsored programmes had increased from the level of 31 per cent in 1995 to 39 per cent in 1998 which led to higher provisioning and it affected the profitability of the banks severely.

The study conducted by Deepak Shah (2001, p.5) revealed that declining share of net worth had caused an increase in debt assets ratio whereas the return on assets had shown a drastic fall of Buldana DCCB during the study period.

Puhazhendhi and Jayaraman (1999, p.18) identified that non-repayment of rural loans and accumulation of overdue was realized to be associated with the high transaction costs for funds coupled with lower financial margins

Chakraborty, B. (1998, p.27) found that weak marketing system and poor procurement price to the farmers were the reasons for high overdue in the selected PACS and it has adversely affected the financial health of the Nodia DCCB. Veeresh, D. (1996, p.438) pointed out that the anticipation of the loan wavier scheme had been the prime reason for default. This trend was found due to false statements made by the politicians in their election campaign with the intention to take an election advantage from the rural poor. So this sort of misguidance of politicians encouraged the beneficiaries to become willful defaulters.

Significance of the Study:

The Non-Performing Assets have always created a big problem for the banks in India. It is just not only problem for the banks but for the economy too. The money locked up in NPAs has a direct impact on profitability of the bank as Indian banks are highly dependent on income from interest on funds lent.

According to RBI explanations NPA is an asset, including a leased asset, becomes non-performing when it ceases to generate income for the bank. A 'non-performing asset' (NPA) was defined as a financing facility which results in overdue of interest and/ or installment of principal for certain period. The specified period was reduced from four quarters to two quarters since 1995. There are various reforms and Acts that has been implemented to overcome this intense problem. Up gradation of restructured substandard accounts which were in respect of principal installment or interest amount, by whatever modality, would be eligible to be upgraded to the standard category only after the certain period i.e., a period of one year after the date when first payment of interest or of principal, whichever is earlier, falls due, subject to satisfactory performance during the period. The amount provided for earlier for the sacrifice shall also be reversed after the one year period. During this one year period, the sub-standard asset will not get deteriorate in its classification, if satisfactory performance of the account is shown. In case, the satisfactory performance during the one year period is not evidenced, the classification of the restructured account would be governed as per the applicable prudential norms with reference to the pre-restructuring payment schedule.

Scope of the Study:

The study has the following scope:

The study could suggest measures for the banks to avoid future NPAs & to reduce existing NPAs. The study will help to select appropriate techniques suited to manage the NPAs and develop a time bound action plan to check the growth of NPAs.

Recommandations and Suggestions:

Banks must bring out revised Operational Manuals and update them regularly, keeping in view the emerging needs and ensure adherence to the instructions so that these operations are conducted in the best interest of a bank and with a view to promoting good customer service.

These are to form the basic objective of internal control systems, the major components of which are: (i) Internal inspection and Audit, including concurrent audit, (ii) Submission of control Return by branches/controlling offices to higher level offices, (iii) Visits by controlling officials to the field level offices, (iv) Risk management systems, (v) Simplification of documentation, procedure and inter office communication channels.

There is need to institute and independent loan review mechanism especially for large borrowal accounts and systems to identify potential NPAs. It is desirable that banks evolve a filtering mechanism by stipulating in-house prudential limits beyond which exposures on single/group borrowers are taken keeping in view their risk profile as revealed through credit rating and other relevant factors. Further. In-house limits be thought of to limit the concentration of large exposures and industry/sector/geographical exposures within the Board approved exposure limits and proper overseeing of these by the senior management/boards It is appropriate if the management committees are reconstituted to have only whole time functionaries in it, somewhat on the pattern of Central Office Credit Committee constituted in the State Bank of India.

All these decisions taken by these committees are put up to the Board of Directors for information. It is appropriate to induct an additional whole time director on the board of the banks with a enabling provision for more whole time directors for bigger banks. (reports 2 IBA Bulletin on 'Management Committee Reconstitution September 1999, Vol.- XIX, P.-7.). There is need to redefine the scope of external vigilance and investigative agencies with regard to banking business. The vigilance manual now being used has been designed mainly for use by Government Departments and public sector undertakings.

Further, information and control systems need to be developed in several areas like:

- Better tracking of spreads, costs and NPAs for higher profitability
- Accurate and timely information for strategic decisions to identify and promote profitable products and customer
- Risk and Asset-Liability management
- Efficient Treasury management

ISSN: P-2455-0515
E- 2394-8450

Educreator Research Journal

VOLUME–XI, ISSUE–III MAY – JUNE 2024

Original Research Article

The policy of licensing new private banks (other than local area banks) may continue. The startup capital requirements of Rs100 crores were set in 1993 and these may be reviewed.

Liquidity risk is the most important of the financial risk that banks face and it is necessary that it is kept within acceptable limits so that the bank's dependence on the money markets is minimal. The banks must furnish satisfactory evidence to the Statutory Auditors/Inspecting Officers about the manner of regularization of the account to eliminate doubts on their performing status.

Conclusion: Banks are institutions that deal with money, their business is finance, and their stock in trade is currency and credit. Banking is as old as authentic history of the world. For any financial system, NPAs are an inevitable burden and this need to monitor regularly in order to prevent any account becoming an NPA. Indian public sector banks collectively owed approximately 6.17 trillion Indian rupees in non-performing assets in fiscal year 2021. For efficient handling of NPAs, it is important to identify the factors which are responsible for creation of NPAs in Banks. They can be classified in to three broad categories viz., External factors, internal factors and Borrower related factors. The external factors are the factors, which are outside the control the banks whereas the internal factors are within the control of the banks. The borrower related factors arise not only due to the influence of external and internal factors but also the inability of the borrowers to repay and their attitude towards the settlement of loans. To cope up with non-performing assets is a big challenge for the entire banking sector. It dumps the fund on the one hand and reduces the profitability of the bank on the other. Hence, to identify, recover and control such NPAs is essential. NPAs but still a lot needs to be done to curb this problem.

References:

K. N. Subramaniyam (1982) - 'Modem Banking in India', New Delhi, Deep and Deep Publication.

Chakraborthy, B. (1999), Resource Management - An Appraisal of the Noida District Central Cooperative Bank, Cooperative Perspective, Vol.32, No.4, Jan-March.

Deepak Shah (2001), Financial Health of Credit Cooperatives in Maharastra: A Case of Sangli and Buldana District Central Cooperative Banks (www. ideas.repec. org).

Pagaria, M.L & Ram Jass Yadev (2002), The Study the Loss Making Rural Branches in Rajasthan, The Journal of India Institute of Bankers, Vol.73, No.3, July - September.

Puhazhendhi and Jayaraman (1999), Rural Credit Delivery: Performance and Challenges Before Banks, Economic and Political Weekly, January.

The Banking Regulation Act, 1949 (10 of 1949), Universal Law Publishing (2016), p.7

Ramrao,Revati,Anjali (2008), A Comprehensive Study of NPA in Scheduled Urban Co-operative Banks

Sinha, S.K. (1998), Rural Credit and Cooperatives in India, Suneja Publishers, New Delhi.

Sudarsana Reddy, G. (2004), Management of NPAs in Public Sector Banks, Banking Finance, Vol.XVII, No.3, March

Shraddha Kokane1 , Dr Shriram Nerlekar(2017) Recapitalization of Public Sector Banks - Will it reduce the Non-Performing Asset Levels , IOSR Journal of Economics and Finance (IOSR-JEF) e-ISSN: 2321-5933, p-ISSN: 2321-5925. PP 84-91

ISSN: P-2455-0515
E- 2394-8450

Educreator Research Journal

OPEN ACCESS

VOLUME–XI, ISSUE–III

MAY – JUNE 2024

Original Research Article

Reports:

1. GOI (1991), The Committee on the Financial System.
2. IBA Bulletin on 'Management Committee Reconstitution September 1999, Vol.-XIX, P.-7.
3. The RBI Circular dated. 30-8-2001, Para- 5.8.6.

Websites:

https://indiankanoon.org/doc/1594694/

https://www.ica.coop/en/cooperatives/what-is-a-cooperativehttps://www.academia.edu/8002656/SECTION_II_CO_OPERATIVE_BANKING_IN_INDIAhttps://www.scribd.com/document/220250307/Intro

Cite This Article:

Ms. Khurana D.R.* (2024).** *Unraveling the NPA Crisis: A Deep Dive into Cooperative Banking Concerns.* In Educreator Research Journal: Vol. XI (Issue III), pp. 79–88 **ERJ.** ***https://doi.org/10.5281/zenodo.12930977