

澳門研究簡報

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澳大邀專家學者為明年（2023 年財政年度）施政提供建議 UM Invites Experts and Scholars to Provide Suggestions on SAR Government's Policies Next Year (Fiscal Year 2023)

澳門大學澳門研究中心於 8 月 31 日舉行「2023 年財政年度澳門特區施政報告前瞻」線上座談會，邀請專家學者為來年施政提供意見。會議由該中心主任林玉鳳主持，各專家學者重點討論穩定民生經濟、融入國家發展等政策措施，同時較關注特區政府的防疫措施，建議加強應對突發事件的能力，預先制定不同情況的應變方案。

On 31 August, the University of Macau (UM) Centre for Macau Studies (CMS) held an online seminar on the Macao SAR Government's Policy Address for the fiscal year 2023. During the event, which was chaired by CMS Director Agnes Lam, experts and scholars, provided suggestions on the SAR government's future policies and measures in the next fiscal year, including policies on stabilizing the economy and improving people's livelihood and strategies to integrate into national development. The participants also addressed the SAR Government's anti-pandemic measures and suggested enhancing the ability to cope with emergencies as well as formulating contingency plans for different situations in advance.

澳門管理學院院長唐繼宗認為，未來澳門將會繼續受到美國貨幣政策、地緣政治、疫情和防控因素的影響，應採取積極的財政政策，招商引資，大力進軍深合區，他認為施政重點應在維持市場信心、穩住博彩旅遊市場、維持基層市民民生之上。澳大社會科學學院助理教授關鋒認同明年施政重點在於恢復市場信心，可建立恆常防疫機制、「澳門式」動態清零政策，讓市民、投資者、社會能有計劃地安排未來活動，減少負面預期。

According to Tong Kai Chung, president of the Macau Institute of Management, Macao will continue to be affected by the US monetary policy, geopolitical volatility, the COVID-19 pandemic, and factors related to pandemic prevention and control. The SAR Government should adopt a proactive fiscal policy to attract business investment and make strenuous efforts to develop the Guangdong-Macao In-depth Cooperation Zone in Hengqin. He also pointed out that the SAR government's policy next year should focus on restoring market confidence, stabilizing the gaming and tourism market, and supporting the livelihoods of grassroots residents. Kwan Fung, an assistant professor in the Faculty of Social Sciences (FSS), agreed that the policy next year should focus on restoring market confidence. He suggested that the SAR government should establish a permanent mechanism for pandemic prevention and develop a 'Macao-style' dynamic COVID-zero policy, so that local residents, investors, and society can make plans for the future accordingly with less negative expectations.

澳大工商管理學院助理教授李振國認為，在短期內，澳門會繼續受到失業、就業不足、經濟衰退等影響，特區政府可創造短期工作和實習崗位，進行薪金補貼以降低失業率；構建便利往返和通關政策以爭取內地旅客。澳大澳門研究中心客



林玉鳳主任 (Prof. Agnes Lam)



唐繼宗院長 (President Tong Kai Chung)



關鋒助理教授 (Dr. Kwan Fung)

席講師陳志誠認為，未來經濟可能比預期更差，特區政府短期內可以多作補助，但長久必須要找到短期補助與恆常政策之間的平衡點。澳大工商管理學院副教授蕭志成表示，由於全球經濟政治的變化，世界供應鏈出現很大的問題，未來政府應密切監測物價、通脹、利率的變化，在小微企和市場供應方面作出較為即時的應對措施，以緩解失業問題，他同時呼籲需要密切關注房貸拖欠比率增加引發的問題，建議特區政府對未來可能會出現的危機情況制定預期方案。

According to Lei Chun Kwok, an assistant professor in the Faculty of Business Administration (FBA), Macao will continue to be affected by unemployment, underemployment, and economic recession in the short term. The SAR Government should create short-term jobs and internships and provide salary subsidies to reduce the unemployment rate. The government should also explore new policies to make border crossing arrangements smoother to attract mainland visitors. According to Chan Chi Shing, an adjunct lecturer at CMS, the future of the economy is likely to be worse than expected. Although the SAR Government can provide more subsidies in the short term, it should find a balance between providing short-term subsidies and designing long-term policies. According to Ricardo Siu Chi Sen, an associate professor in the FBA, the global economic and political changes have disrupted the global supply chain. The SAR government should closely monitor the changes in prices, inflation, and interest rates, take immediate countermeasures to support micro enterprises, and regulate the supply chain so as to lower the unemployment rate. He also called for attention to problems caused by the increase in mortgage arrears and urged the government to formulate plans to anticipate possible crises in the future.

澳大人文學院葡文系主任姚京明認為，因應澳門與葡語國家的法律制度的相似性，澳門可以為中國和葡語國家提供雙向法律諮詢服務的發展方向邁進，既增加就業，也能更貼近業界提供服務；同時，他認為澳門應大力發展多元化的非博彩項目，也要關注保留澳門的特色以及獨獨特的文化魅力。

According to Yao Jingming, head of the Department of Portuguese of the Faculty of Arts and Humanities (FAH), in view of the similarities between the legal systems of Macao and Portuguese-speaking countries, Fórum de Macau can develop itself in the direction of providing two-way legal advisory services to China and Portuguese-speaking countries, which can not only create more jobs but also take advantage of existing industries. He added that the SAR Government should accelerate the development of non-gaming industries while maintaining the unique cultural characteristics of Macao.

明愛總幹事潘志明認為，為應對社會的突發情況，特區政府可設立緊急支援隊伍，以便在總體政策上迅速作出應對。他認為，民生上可加強銀髮事業的發展，優化各類長者住宿安排，讓更多唐樓長者能夠得到支援；此外，有不少外僱承擔本地人的照護工作，他們的身心健康與本地人的健康息息相關，需要一定的服務和照料。澳大社會科學學院助理教授陳建新認為，特區政府需正視澳門市民對前景的無力感；增加特區政府與社會的溝通。他留意到澳門規劃發展的新四大產業中，只有文旅會展商貿平台與目前產業結構相近，中青年人士如想進入其他新產業恐怕會較為困難，建議政府、高等院校提供較多課程及培訓協助居民進修轉業。

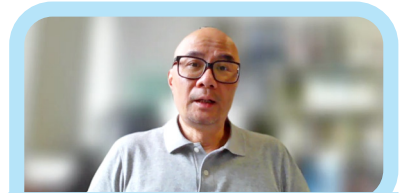
According to Pun Chi Meng, secretary-general of Caritas Macau, the SAR government should set up an emergency response team to cope with unexpected situations in the community and make quick responses based on its general policy. In terms of improving people's livelihood, he suggested that the government should strengthen its services for the elderly, including optimizing the current housing arrangements so that more elderly people living in old tenement buildings can receive support. In addition, as there are many non-local workers working as domestic helpers in households in Macao, he suggested



李振國助理教授 (Dr. Lei Chun Kwok)



陳志誠客席講師 (Dr. Chan Chi Shing)



蕭志成副教授 (Prof. Ricardo Siu Chi Sen)



姚京明主任 (Prof. Yao Jingming)



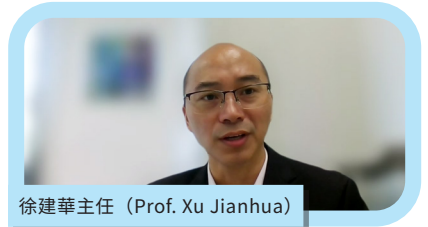
潘志明總幹事 (Secretary-general Pun Chi Meng)



陳建新助理教授 (Dr. Chan Kin Sun)

that the SAR Government should care for these workers and provide appropriate services for them to maintain their mental and physical health. According to Chan Kin Sun, an assistant professor in the FSS, the SAR government should face squarely the feelings of helplessness among Macao residents towards their future prospects and increase the communication between the government and the local community. He also noted that among the four new industries planned to be developed in Macao, only the cultural, tourism, convention, and business industry is similar to the current industrial structure, and it is difficult for young and middle-aged people to enter the other three industries. He suggested that the government and higher education institutions should provide more courses and training to help residents in changing their careers.

澳大社會科學學院社會學系主任徐建華表示，疫情下雖然電子騙案增多，但澳門的整體犯罪率大幅下降，有組織犯罪可能會轉而尋找新的犯罪方式。他更提到，澳門的自殺率一向較高，然而本年的急速上升更令人憂心，截止 8 月 31 日，澳門已有 47 宗自殺個案，而自殺未遂個案則逾百宗，他認為特區政府未來施政應注意舒緩弱勢人士的內在壓力。此外，各專家學者不約而同地提到，在現時「還息不還本」的政策下，樓宇借貸還款的問題可能被暫時隱藏起來，這個問題也值得特區政府關注。



徐建華主任 (Prof. Xu Jianhua)

According to Xu Jianhua, head of the Department of Sociology of the FSS, despite an increase in e-commerce frauds, the crime rate in Macao has declined significantly during the pandemic. He added that organized crime groups could find new ways of committing crimes. He also pointed out that the suicide rate in Macao has always been high and expressed concern over the rapid increase in the number of suicides this year. As of August 31, there have been 47 suicides and over 100 suicide attempts in Macao. He suggests that the SAR Government should try to ease the stress of underprivileged people in its future policy. In addition, many experts and scholars mentioned that under the current policy of 'interest repayment without principal repayment', the problem of mortgage repayments may be temporarily hidden but this issue deserves the attention of the SAR Government.

「澳門學堂」增強中學生人文社科知識 “Educational Talk Series” Enhances High-school Students’ Knowledge of Humanities and Social Sciences in Macao

作為澳門中小學生人文社科教育基地的組成機構之一，澳門大學澳門研究中心開展「澳門學堂」書院及中學教育系列講座，第一及第二場講座已於本年 3 月和 5 月在嘉諾撒聖心英文中學和化地瑪聖母女子學校成功舉辦。

講座邀請到澳門大學工商管理學院金融與商業經濟學系副系主任李振國博士擔任演講嘉賓，兩校超過 190 名師生出席了該活動。李博士深入淺出地分享了關於橫琴粵澳深度合作區（深合區）和粵港澳大灣區的相關資訊，並詳細講解了其與澳門經濟適度多元的關係，學生們在活動中參與互動環節、積極發問。接下來，「澳門學堂」邀請到澳門本地生物學專家、「澳門細蟻」的發現者梁志文到中學進行講座，介紹澳門的生物多樣性等相關議題。如校方有興趣，可與本中心工作人員聯絡。



圖片：澳門研究中心 (Photo: CMS)

Serving as one of the constituent institutions of the Macao Base for Primary and Secondary Education in Humanities and Social Sciences, the UM Centre for Macau Studies has launched the “Educational Talk Series” at the residential colleges and local high schools in order to support the mission of educating students with knowledge about Macao. The first and second talk were successfully conducted at the Sacred Heart Canossian College (English Section) in March and at the Our Lady of Fatima Girls’ School in May of this year, respectively.

Dr. Lei Chun Kwok, the Associate Head of Department of Finance and Business Economics of Faculty of Business Administration, joined the CMS team as the invited guest speaker for the seminars. More than 190 senior high-

school students and their teachers attended the seminars. They were shared lots of insights about the Guangdong-Macao In-Depth Cooperation Zone in Hengqin & the Greater Bay Area (GBA), and economic diversification of Macao. Students actively interacted with the guest speaker and raised various queries during the sharing session. Later on, Dr. Leong Chi Man, a local biological expert, will be invited to give a lecture about Macao's biodiversity and other related issues. Please feel free to contact the staff of the Centre for arrangements of educational talks.

化地瑪聖母女子學校劉麗妹校長認為相關講座內容提醒了學生們澳門未來發展與「大灣區」及「深合區」息息相關，澳門的未來也是學生們的未來，學生們需自我增值，為未來升學、就業尋找方向，回饋社會。她認為，學校開展的學生教育、講座等活動，需重視學生們全人發展的需要，讓學生們明白自己的多元智能、成為社會的助力者和貢獻者，並追求和平。澳門許多前人學者進行的研究，都有助於學生們站在巨人的肩膀上發展得更高更遠。

The school principal of Our Lady of Fatima Girls' School commented that the educational talk helps bring the concern to the students about the future development of Macao, which is closely related to the "Greater Bay Area" and the "Hengqin Guangdong-Macao In-depth Cooperation Zone". The future of Macao is exactly the future of the students. All the young students should increase their own value of life by looking for the proper directions for their future studies and career development, and hence giving back to the Macao society as the ultimate goal. Principal Lao believes that, when they are planning the student education programs, seminars and any activities, they have pay attention to the needs of students' whole-person development. With such a core, the students can understand more about their multiple intelligence, to pursue peace and to become supporters and contributors to the society. The researches which have been carried out by many of our former scholars in Macao have assisted the students to grow higher and farther on the giants' shoulders.



圖片：澳門研究中心 (Photo: CMS)

參與講座的同學表示，講座讓她們印象最深刻的是了解到澳門研究中心正在編輯《澳門志》這一部重要的刊物。此外，亦了解到博彩一業獨大、產業單一是澳門長久以來的問題，疫情之下更將其突顯，所幸的是特區政府積極地推行不同的政策和措施，緩解了經濟下滑的問題。同學表示是次講座給予了她們許多新資訊，並明白到深合區對澳門經濟適度多元十分重要，如有機會，她們皆願意前往深合區發展。

The students who participated in the educational talk said that the most impressive part about the talk was that they learned that the Centre for Macau Studies is currently preparing the important publication *Macao Gazetteer*. In addition, they agreed that the dominance of the gaming industry and the monopoly of the industry are long-standing problem in Macao, which have become even more significant under the COVID-19 epidemic. Fortunately, the Macao SAR Government has actively implemented different policies and measures to alleviate the problem of economic downturn. The students mentioned that the talk provided them a lot of new information, and they understood that the Hengqin Guangdong-Macao In-depth Cooperation Zone is very important to the moderate economic diversification of Macao. They are willing to work at the Hengqin Guangdong-Macao In-depth Cooperation Zone if they have the opportunities in the future.



圖片：澳門研究中心 (Photo: CMS)

橫琴創業澳門「芯」 Creating “UMChip” Plants in Hengqin

2021 年，澳門大學副校長馬許願教授獲頒澳門特區政府教育功績勳章，2008 年他被獲選為美國電機與電子工程師學會院士（IEEE Fellow），是澳門首位獲得該殊榮的學者。澳門芯片的故事就是從他在 1992 年來到澳門開始的。當時，在澳門進行芯片研究可謂是從零開始，馬教授帶領着學生在當時氹仔小山崗的校舍實驗室裏埋頭苦幹，研發出首塊芯片，至 2022 年剛好三十年。當年的學生們已成為現在芯片研究團隊的核心成員，當中，余成斌教授於 2021 年獲頒澳門特區政府工商功績勳章，麥沛然教授於 2019 年亦被選為電機與電子工程師學會會士。

Prof. Rui Paulo da Silva Martins, Vice-Rector of the University of Macau (UM), was awarded the Medal of Merit in Education from the Macao SAR Government in 2021 and was elected a fellow of the Institute of Electrical and Electronics Engineers (IEEE) in 2008, the first scholar in Macao to receive this honor. The story of UMChip began when he came to Macao in 1992. At that time, chip research in Macao was started from scratch. It has been thirty years since Prof. Martins led his students to develop the first chip in a laboratory at the UM old campus in Taipa. His students are now core members of the UMChip research team. Among them, Prof. U Seng Pan was awarded the Medal of Merit in Industry and Commerce from the Macao SAR Government in 2021, and Prof. Mak Pui-In was elected a fellow of the IEEE in 2019.

三十年研究歲月的第一個十年，芯片研究從無到有，馬教授團隊獨力奮獻，為「澳門芯」打下扎實的基礎。第二個十年，研究團隊漸漸擴大，培養了不少專門人才，其研究已達到國際水平，2010 年，國家科技部批准成立「模擬與混合信號超大規模集成電路國家重點實驗室」，證明了澳門芯片研究的國際地位。而第三個十年，澳門芯片研究已在全球處於領先水平，研究論文更數度刷新國際固態電路會議（ISSCC）這個芯片奧林匹克的世界紀錄。可以說，目前最先進的互聯網、個人電腦、手機、全球定位系統等，都有澳門芯片和技術的蹤影。2022 年 3 月，余成斌教授在「橫琴粵澳深度合作區人才與科創產業推進建設研討會」上表示，「澳門芯」的學術理論研究已經十分成熟，接下來應該發展「應用研究」，即是說，將學術成果轉化為可以應用的技術，並建立相關產學研的鏈條。

In the first decade of 30 years of research, Prof. Martins's research team worked alone to lay a solid foundation for the UMChip. In the second decade, the research team has gradually expanded and nurtured many professionals, and its research has reached international standards. In 2010, the Ministry of Science and Technology of the People's Republic of China approved the establishment of the State Key Laboratory of Analog and Mixed-Signal VLSI (AMSV), proving the international status of UMChip research. In the third decade, Macao has become a global leader in chip research, and UM has repeated broken world records in terms of chip size at the IEEE (The Institution of Electrical and Electronics Engineers) International Solid State Circuit Conference (ISSCC), which is considered the Olympics in microelectronics. It can be said that UMChip forms part of the many information-technology-based products, including mobile phones, personal computers, and the global positioning systems. In March 2022, Prof. U Seng Pan said at a seminar titled “Talent Development Policy and the Promotion of Technological Innovation in Guangdong-Macao In-Depth Cooperation Zone in Hengqin” that the academic research on UMChip has achieved impressive results, and the next step is to develop applied research, which is to transform academic results into applied technologies and to establish industry-academia collaboration.

橫琴粵澳深度合作區是定位很明確，就是要支持澳門經濟適度多元發展，深合區產業的選定需適合澳門，才能為經濟多元發展提供支撐。澳門在模擬芯片、微電子集成電路產業上具有國際領先技術和經驗，其在無線通訊、能源管理、信號處理等多方面都有着不同的應用，無論在產業基礎、技術、人才上都可較為快速地運用到深合區上。

The positioning of Guangdong-Macao In-Depth Cooperation Zone (Cooperation Zone) in Hengqin is clear, which is to support economic diversification of Macao and the Cooperation Zone needs to develop industries suitable for Macao in order to provide substantial support for the city's economic diversification. Macao has world-leading technology and experience in analog chip research and the development of the microelectronics integrated circuit industry, which have been applied in wireless communication, energy management, signal processing and other fields.

2022年3月29日，在「橫琴粵澳深度合作區人才與科創產業推進建設研討會」上，專家們都認為深合區科創產業的成功建設，需加快頂層設計，以具潛力的新生產業如「澳門芯」作帶動，盡快落實相關產業扶持政策，包括各類配套、支援、補貼等。需解決人才的落地困難如兩地稅收、人才獎勵、人才公寓、交通及社保等配套問題。短期來說，引進其他高校的相關實習生投入產業，長期來說，要在深合區高校進行人才的重點培養。

On 29 Mar 2022, At the seminar “Talent Development Policy and the Promotion of Technological Innovation in Guangdong-Macao In-Depth Cooperation Zone in Hengqin”, experts agreed that for the successful construction of science and technology industries in the Cooperation Zone, it is necessary to accelerate the top-level design, to take the lead of developing emerging industries, such as UMChip, and to implement industrial support policies as soon as possible. It is necessary to tackle challenges facing the introduction of professionals into the Cooperation Zone, such as the difference in taxation between Macao and Hengqin, subsidies, housing, as well as transport and social security. In the short term, the Cooperation Zone can rely on student interns from universities outside the zone, while in the long term, the zone should focus on cultivating talent through its own universities.

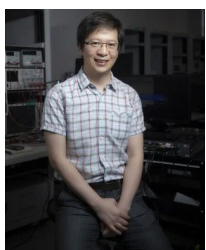


澳門大學澳門研究中心與珠海澳大科技研究院，聯同廣東省政協港澳委員會、中衡智匯協會、社會科學學院粵港澳大灣區研究中心於2022年3月29日舉辦「橫琴粵澳深度合作區人才與科創產業推進建設研討會」，邀請共近二十位政協委員及專家學者就橫琴粵澳深度合作區的人才政策和科技創新產業的建設等議題進行深入討論。

UM Centre for Macau Studies, and Zhuhai UM Science & Technology Research Institute, together with the Committee on Liaison with Hong Kong, Macao and Taiwan of the Guangdong Provincial Committee of the Chinese People's Political Consultative Conference (CPPCC), the Association of Chong Hong Intellectual Elites, and the Centre for the Guangdong-Hong Kong-Macao Greater Bay Area Studies of UM's Faculty of Social Sciences, held a seminar titled “Talent Development Policy and the Promotion of Technological Innovation in Guangdong-Macao In-Depth Cooperation Zone in Hengqin” on 29 Mar 2022. During the event, nearly 20 CPPCC Guangdong Provincial Committee members and experts had in-depth discussions on talent development policy and the promotion of technological innovation in Guangdong-Macao In-Depth Cooperation Zone in Hengqin.

圖片：澳門研究中心
(Photo: CMS)

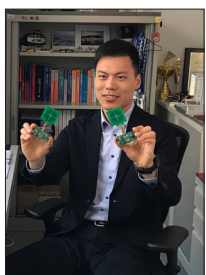
「澳門芯」簡介 About UMChip



麥沛然教授之「無電池智能電子芯片」可為國家解決大規模物聯網發展的技術瓶頸——人手換電池和電池不環保兩個問題，該成果榮獲第四屆「科學探索獎」。

Prof. Mak Pui In's project “Battery-less Intelligent Electronic Chips”, which is expected to solve two technical bottlenecks in the development of massive Internet of Things in China, namely manual battery replacement and batteries not being environmentally friendly, were awarded the Xplorer Prize 2022.

資料來源 Source: <https://www.um.edu.mo/zh-hant/news-and-press-releases/press-release-detail/54158/>.



路延教授團隊2017年的International Solid-State Circuits Conference (ISSCC)上發佈了全球首款全集成的雙向無線充電收發機 (Bidirectional Wireless Power Transceiver) 芯片。它通過複用無線充電接收端的功率管、匹配電容、以及WPT的線圈，在不增加硬件成本的前提下，實現手機與手機的無線互充。

The world's first fully integrated Bidirectional Wireless Power Transceiver chip was announced at the International Solid-State Circuits Conference (ISSCC) in 2017 by Prof. Lu Yan's team. By reusing the wireless power tubes and WPT coils, as well as matching capacitors, it enables wireless inter-charging of mobile phones without increasing hardware costs.

資料來源 Source: 《澳門大學產學研項目》University of Macau Industry-University-Research Projects, <https://www.um.edu.mo/zh-hant/research/publications/>.

澳門研究 · 國際視野 Macao Studies in Global Perspective

從本期開始，我們會為讀者帶來「澳門研究 · 國際視野」專欄，介紹不同學者在不同國際刊物上所發表的有關澳門的研究。本期我們帶來了澳門生態方面的資訊，推介華南農業大學和澳門聖若瑟大學團隊的關於澳門石牆樹和紅樹林保護的論文，以下為相關內容。

Starting from this issue, we created a specific column, namely, “Macao Studies in Global Perspective”, which will introduce the research published by various scholars in different international journals. The following are two papers published by the South China Agricultural University and University of St. Joseph, respectively, about the stone wall tree in urban area of Macao and mangrove conservation in Macao SAR.

I 澳門城市區域石牆樹的樹種特徵及文化價值 “Species Characteristics and Cultural Value of Stone Wall Trees in the Urban Area of Macao” Journal Impact Factor™ (2020) 4.38 Scientific Reports, Vol. 12, Issue 1 (2022)

Meisi Chen¹, Songyi Huang^{2,3}, Zheng Chen², Yemiao Xing², Fuwu Xing⁴, Kun Fong Leong⁵,
Yaonan Yang⁶, Yuan Qiu¹, Xinsheng Qin¹

¹ College of Forestry and Landscape Architecture, South China Agricultural University

² Guangzhou Landscaping Company

³ South China University of Technology

⁴ South China Botanical Garden, The Chinese Academy of Sciences

⁵ Association for the Promotion of Landscaping and Greening in Macao

⁶ Brilliant Landscaping & Gardening Co Ltd.

石牆為澳門的植物提供了一個獨特的棲息地，緩減都市化引致的棲息地碎片化、提升都市的多元生態情況。該研究透過分析澳門石牆樹的樹種構成、出現頻率和分佈位置，探討其生態和文化價值。

The stone walls in Macao offer a unique habitat for plants, mitigate urbanization-induced habitat fragmentation, and increase urban biodiversity. The authors examined the ecological and cultural values of stone wall trees in Macao by analyzing their species composition, frequency of occurrence and distribution locations.

研究方法 Methods

該研究收集了 31 個石牆樹的樣本，並根據《中國植物志》和《澳門植物志》確認和分類。主要物種的確認者為邢福武教授和秦新生教授，他們在粵港澳的實地調查上具有豐富經驗，且了解該地區石牆樹的情況。本研究的數據使用 Excel 和 GIS 統計和分析，並使用雅卡爾相似係數（Jaccard Similarity Index）來對比不同環境的伴生植物的樹種相似性。

A survey was conducted for this study and 31 samples of stone wall trees were collected. These species were identified and classified according to *The Flora of China* and *The Flora of Macao*. The main species identifiers were Professors Xing Fuwu and Qin Xinsheng, both of whom have practical experiences in conducting field surveys in Hong Kong, Macao and Guangdong and are familiar with the stone wall trees in the region. Data analysis and statistical integration were performed using Excel and GIS. Jaccard Similarity Index was used to compare the similarity of companion plant species in different environment.

研究結果 Results

該研究在澳門一共尋找到 96 棵石牆樹，分別從屬於 5 個科 6 個屬，其中，桑科中的榕屬出現頻率最高，為 88.5%。桑科多分佈在熱帶地區，榕屬植株高大茂密，表明了澳門的石牆樹具有明顯的熱帶性質。

96 stone wall trees belonging to 6 genera and 5 families were found in Macao. Among them, *Ficus* in the family *Moraceae* was the most frequent species, with an occurrence rate of 88.5%. *Ficus* is tall in shape and has a dense canopy. Since *Moraceae* is mostly distributed in the tropical regions, this indicates that the stone wall tree species in Macao has a distinctly tropical nature.

澳門的石牆樹共計有 16 個種類，分別為土蜜樹、樸樹、枇杷、高山榕、垂葉榕、印度榕、對葉榕、榕樹（正榕）、琴葉榕、筆管榕、斜葉榕、心葉榕、變葉榕、黃葛樹、銀合歡、山葉山黃麻。榕樹（正榕）是最常見的樹種，佔 60.4%，這



圖片：康經紹
(Photo: Hong Keng Sio)

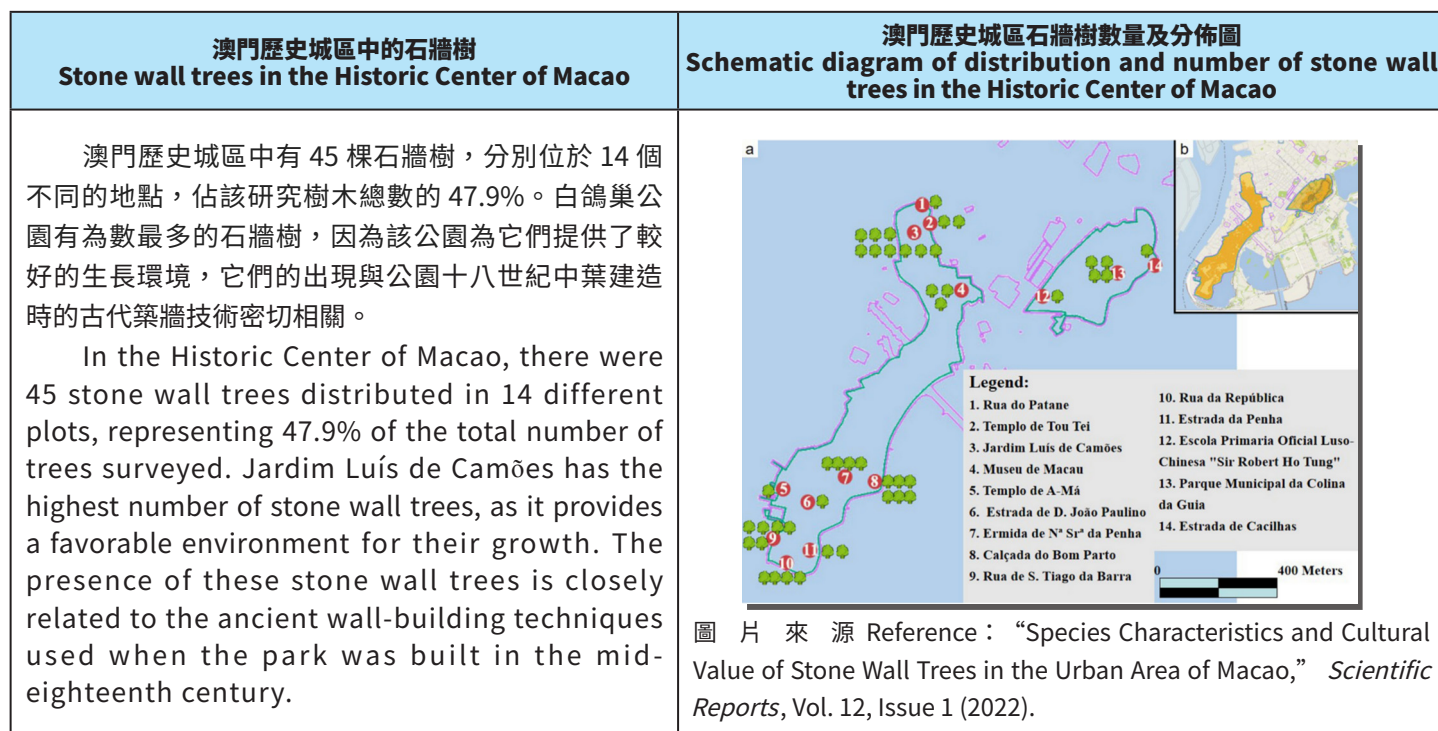
種樹十分健壯、適應性強、生長迅速，是多種鳥類和昆蟲的重要棲息地，可改善當地的微生態和環境。此外，該研究確認了 101 種石牆樹伴生植物，大部分都是有選擇性的，取決於石牆的環境情況。

There were 16 species of stone wall trees in Macao, namely *Bridelia tomentosa*, *Celtis sinensis*, *Eriobotrya japonica*, *Ficus altissima*, *F. benjamina*, *F. elastica*, *F. hispida*, *F. microcarpa*, *F. pandurata*, *F. subpisocarpa*, *F. tinctoria* subsp. *gibbosa*, *F. rumphii*, *F. variegata*, *F. virens*, *Leucaena leucocephala*, and *Trema cannabina*. *Ficus microcarpa* was the most common species with a frequency of 60.4%. This tree species is robust, adaptable, and fast-growing. It is an important habitat for many birds and insects and helps to improve the local microclimate and environment. Moreover, the authors identified 101 species of stone wall tree associated plants in Macao. Most companion plants are selective and contingent to the stone wall habitat.

結論 Conclusion

石牆樹能提升植被多樣性，為都市的野生動物提供寶貴的棲息地和一連串的生態系統支援，石牆及其伴生植物在澳門形成了獨特的都市生態。一個世紀以來，由於較少的人為干擾，壁面的植物自然地茂盛生長。該研究建議小心地保護和維持石牆及石牆樹，以最大限度地提高其生態和審美價值。

Stone wall trees can promote vegetation diversity, provide a range of ecosystem services and are a valuable habitat for urban wildlife. Stone walls and their vegetative companions form a unique urban ecology in Macao. For over a century, the mural vegetation has flourished spontaneously due to minimal human interference. The authors suggested that stone wall trees, along with the stone walls, need to be carefully protected and maintained to maximize their ecological benefits and aesthetic value in the long term.



澳門紅樹林保護：環境教育在學生中的角色

II “Mangrove Conservation in Macao SAR, China: The Role of Environmental Education among School Students”
International Journal of Environmental Research and Public Health, Vol. 19, Issue 6 (2022)
 Journal Impact Factor™ (2020) 3.39 Karen Araño Tagulao¹, Allan B. I. Bernardo², Loi Hoi Kei¹, Cristina Sousa Coutinho Calheiros^{1,3}

¹ Institute of Science and Environment, University of St. Joseph

² Department of Psychology, De La Salle University

³ Interdisciplinary Centre of Marine and Environmental Research (CIIMAR/CIMAR), University of Porto

澳門是幾種紅樹林物種的家園，然而，快速而大規模的城市發展對該地區的紅樹林構成威脅，導致過去幾十年紅樹林不斷減少。為此，有關當局建立了相關生態保護區，以保護和管理本土的紅樹林。為了加強保護效果，對本地居民尤其是學生的教育尤為重要。雖然環境教育已融入於澳門的學校課程當中，但政府仍未提出針對紅樹林保護的相關項目，此外，也沒有一個標準化方法去評估學生對環境相關議題的了解。為了達到聯合國提出的「可持續發展目標」(SDGs) 之目的，澳門聖若瑟大學科學及環境研究所曾舉辦相關環境教育活動，以提高學生對紅樹林保護的社區意識，該研究即探討上述教育活動對學生的環境取向、紅樹林保護的知識和環境保護意識的影響。



圖片：陳嘉欣 (Photo: Chan Ka Ian)

Macao is home to several mangrove species. Rapid and large-scale urban developments in Macao pose threats to the mangrove forests in the area, resulting in a steady loss of mangroves over the past decades. Local authorities have established special Ecological Zones to protect and manage local mangroves. To enhance local conservation efforts, it is important to educate local people, especially students, about the value of mangroves. Although environmental education has been integrated into the school curriculum of Macao, the government has not launched any environmental education program for mangrove protection. Also, there are no standardized assessments used to evaluate students' understanding of environment-related topics. Aiming to achieve the Sustainable Development Goals (SDGs), the Institute of Science and Environment of the University of St. Joseph (USJ) in Macao provided high-quality environmental education activities to raise community awareness of mangrove conservation. This study examined the impact of these activities on students' environmental orientation, their knowledge, and their attitudes toward mangrove conservation in Macao.

研究方法 Methods

該研究採用準實驗研究模式。環境教育活動於 2020 年 9 月 14-24 日舉行，83 名來自相同學校的學生首先進行了時長 45 分鐘的展覽參觀活動，隨後前往路氹城生態保護區進行為時一個半小時的生態考察。在活動前後，學生需填寫前測和後測問卷，該問卷即為 Dunlap 等 [1] 建立的「新環境範式」(NEP) 量表，當中因應澳門的本土情況作出部分修訂，所收集得來的數據會作出描述性分析、重複測量協方差分析 (ANCOVA) 和多元協方差分析 (MANCOVA)。

A quasi-experimental study was conducted for this research. Students participated in the environmental education activities between 14-24 September 2020. They took part in a 45-minute exhibition tour, followed by a one-hour guided field trip to the Ecological Zone in Macao. 83 students from the same local school completed a pre- and post-survey the day before and the day after the activities. The New Environmental Paradigm (NEP) Scale developed by Dunlap et al. [1] was used to assess the effectiveness of the activities. The authors adapted the scale to the local context. The data were analyzed using descriptive statistics, repeated measures analysis of covariance (ANCOVA), and multivariate analysis of covariance (MANCOVA).

討論 Discussion

該研究證明了環境教育的正面作用，研究結果表明了學生的親環境態度、紅樹林知識和環境保護意識都有顯著增強。該研究結果與 SDG 11 可持續的城市和社區、SDG 12 優質教育、SDG 13 氣候行動、SDG 14 水中生命特別相關，建議政策制定者把紅樹林保護活動尤其是實地考察納入到學校的正規教育課程當中。

This study demonstrated positive outcomes of an environmental education intervention. Students' pro-environmental orientations, their knowledge about mangroves, and their attitudes toward environmental protection showed the strongest improvements. The results of this study are particularly relevant to the following SDGs: SDG 11: Sustainable cities and communities, SDG 12: Quality education, SDG 13: Climate action and SDG 14: Life below water. The authors suggested policy makers to incorporate mangrove conservation education activities (e.g., adding outdoor field trips) into the formal education curricula at local schools.

[1] R.E. Dunlap, K. D. Van Liere, A. G. Mertig, R. E. Jones, "New Trends in Measuring Environmental Attitudes: Measuring Endorsement of the New Ecological Paradigm: A Revised NEP Scale," *Journal of Social Issues*, Vol. 56, Issue 3 (2000), pp. 425-442.

二十世紀澳門軍事碉堡 The Twentieth Century Military Pillboxes In Macao

澳門半島的西望洋山、媽閣山、望廈山、青洲山、東望洋山、氹仔大潭山、路環及九澳的自然山嶺，留存了不少碉堡（機槍堡）遺址，呂澤強、鄭國興在《澳門二十世紀軍事碉堡初步研究》（《澳門研究》2022 年第 1 期，第 144—151 頁）中作出了詳細的討論，以下是相關內容簡介。

There are a number of pillboxes could be found in the natural hills located in the Penha Hill, the Barra Hill, the Mong-Há Hill, the Ilha Verde Hill and the Guia Hill at Macao Peninsula, Taipa Grande Hill at Taipa, Coloane and Ká-Hó. Lui Chak Keong and Cheang Kuok Heng discussed them in their article “A Preliminary Study on the Military Pillboxes of Macao in the 20th Century” (*Journal of Macau Studies*, No. 1 (2022), pp. 144-151), here is the brief summary of the pillboxes.

碉堡為第一次世界大戰出現的小型混凝土防禦工事，外形與盛放藥丸的小圓形盒子相似。

Pillbox is a kind of small concrete fortification that appeared in World War I. It looks similar in shape to a small round box for containing pills.

西望洋山／媽閣山 · 鮑公馬路附近山體 The Penha Hill, the Barra Hill, near Estrada D. João de Paulino

- 碉堡約 3 米寬 4 米長，高約兩米，部分藏於地下，鋼筋混凝土結構。略呈坐東朝西，隱藏在西望洋山間中，表面曾塗有掩護色漆。平面略為矩形，前方呈凸出半圓形，兩側有矮護牆。前方機槍射擊口成水平條狀，上部留有軍隊徽號的部分遺存，內部中央有曾裝設武器的痕跡，內部牆壁有噴漆塗鴉字句，但沒有編號。
- The pillbox is about 3 meters wide, 4 meters long, and 2 meters high. It's a reinforced concrete structure and partially built underground. The pillbox is facing the west and hidden inside the Penha Hill. Its surface is once painted in protective paint. It's slightly rectangular in flat and shaped with a convex semi-circle in the front and low parapets on both sides. The machine gun firing ports which are in the shape of a horizontal strip locate in the front of the pillbox, with some remained ruins of the army's emblem on the upper part. There are some traces of weapons once installed in the center of the interior part, and spray-painted graffiti on the interior walls, but with no numbering.

西望洋山／媽閣山 · 媽閣山頂 The Penha Hill & the Barra Hill and its hilltop

- 碉堡呈圓筒形，略坐東朝西，直徑約 2 米，高約 2 米，鋼筋混凝土結構。周圍有石砌掩護體，外牆曾塗有掩護色漆，四周有叢林。前方機槍射擊口成水平條狀，留有可水平開合的金屬掩護板，內部沿機槍射擊口下方有凸出的條狀枱，門口內部上方留有“BO-151”的編號，內部地面有人放置膠水桶。
- The pillbox is in cylindrical shape, slightly facing the west, with a diameter of about 2 meters and a height of about 2 meters. It is a reinforced concrete structure and surrounded by a stone shelter, the exterior walls were once painted with cover paint for protection and it is surrounded by jungle. The front machine gun firing port is in the shape of a horizontal strip, leaving a metal shield that can be opened and closed horizontally. There is a protruding strip table along the bottom of the machine gun firing port, and the number “BO-151” is found at the upper part of the interior side of the door. Some plastic buckets were found on the floor inside.

氹仔 · 氹仔炮台 Taipa - Taipa Fortress

- 在炮台北側外圍昔日的石灘上存有一個 20 世紀的碉堡，呈圓筒形，略坐東朝西，直徑約 2 米，高約 2 米，鋼筋混凝土結構。前方機槍射擊口成水平條狀，已被擴大及用茶色玻璃封閉，從門縫窺看，內部沿機槍射擊口下方有凸出的條狀枱。碉堡外牆被重新塗漆及改用作儲物房，外觀的原真及完整性已被破壞。
- There is a pillbox which is made in the twentieth century on the former rocky beach right outside the north side of the fortress. It is cylindrical in shape and facing the west. The diameter of the pillbox is about 2 meters and its height is about 2 meters. It is a reinforced concrete structure. The front machine gun firing port is in the form of a horizontal strip, which has been enlarged and closed with amber-yellow glass. There is a protruding strip table along the bottom of the machine gun firing port that could be seen from the door gap. The exterior of the pillbox has been repainted and used as a storage room, the authenticity and integrity of the exterior was destroyed.



圖片：呂澤強 (Photo: Lui Chak Keong)

氹仔 · 大潭山 (一) Taipa - Taipa Grande Hill (Part 1)

- 碉堡位於山頂的標高柱附近，坐東北向西南，約為 3 米寬、3 米長，整個藏於地下，前部露出地面約 70 公分。平面呈矩形，前部凸出為八角形，其上部有圓形頂蓋。鋼筋混凝土結構。內部可分為兩個空間，八角形平面部分地面較高，並有樓梯分隔，該處頂部水平 360 度方向有 8 個機槍射擊口，其內側留有原可上下推拉的鐵製掩護板，均鏽蝕嚴重。
- The pillbox locates near the elevation column on the top of the hill, locating at northeast and facing southwest. It's about 3 meters wide and 3 meters long. The plane is rectangular, the front protrudes into an octagon, and the upper part has a round top cover, and in reinforced-concrete structure. The interior part are divided into two spaces. The part of the octagonal plane is higher on the ground and separated by stairs. There are a total of 8 machine gun firing ports on the top of the 360-degree horizontal direction. The iron shields are severely corroded.

氹仔 · 大潭山 (二) Taipa - Taipa Grande Hill (Part 2)

- 碉堡位於大潭山的下山山徑附近，坐東向西，平面略呈矩形，前部分呈三角形，約 3 米寬、3 米長，鋼筋混凝土建造。建築物大部分藏於地下，只外露約 1 米高的前方部分，該部分向外呈直角，兩側面近地處開有水平條狀的機槍射擊口，內部可分為兩個空間。整個碉堡的原真及完整性較高，未見曾被維修，但機槍射擊口的金屬掩護板及相關構件已全部缺失。
- The pillbox locates near the downhill trail of Taipa Grande Hill. It locates at the east and faces the west, with a slightly rectangular plane and a triangular front part, about 3 meters wide and 3 meters long. It is constructed of reinforced concrete. Most of the building is hidden underground, only the front part in about 1 meter high is exposed. This part is at a right angle to the outside. There are horizontal strips of machine gun firing ports near the ground on both sides. The authenticity and integrity of the entire bunker is relatively high, and it has not been repaired, but the metal shield and related components of the machine gun firing port are all missing.

路環 · 路環炮台 Coloane - Coloane Fortress

- 在炮台範圍內存有一個 20 世紀的碉堡，坐東南向西北，平面呈矩形，約 3 米寬、3 米長，部分藏在地下，有下行梯級連通入口，近入口內牆仍留有編號“CA-197”。西北面開有水平條狀的機槍射擊口，碉堡後來被改建，內部用作儲物。
- There is a pillbox made in the twentieth century in the area of the fort. It locates at the southeast and faces the northwest. The plane is rectangular, about 3 meters wide and 3 meters long. Some part of it is hidden underground. There are some descending steps connecting the entrance, and some numbers, “CA-197”, are found on the inner wall near the entrance. There are horizontal strips of machine gun firing ports on the northwest side. The pillbox was later converted and used as storage inside.

路環 · 疊石塘山 Coloane - Coloane Alto

- 碉堡位於路環田畔街的山邊，荔枝碗馬路對面，坐東向西，平面呈矩形，約 2 米半寬、2 米半長、高約 2 米，鋼筋混凝土建造於大石上。碉堡向西及北分別開有水平條狀的機槍射擊口，內部在機槍射擊口前近地面處設有用於冷卻武器的水槽，近入口內牆仍留有編號“CA-195”。鄭國興先生於 2013 年曾入內考察，他表示當時碉堡內的地面中央有一處被 1.2 米寬、1.2 米長混凝土板臨時封閉的入口，可能與射擊或地道有關。
- The pillbox locates at the hillside of Estrada do Campo, Coloane, across the road from Estrada de Lai Chi Vun. It locates at the east and face to the west and has a rectangular plan. It's about 2.5 meters wide, 2.5 meters long, and 2 meters high. Reinforced concrete is built on boulders. The pillbox has horizontal strip-shaped machine gun firing ports to the west and north respectively. There is a water tank for cooling weapons near the ground in front of the machine gun firing ports inside. The inner wall near the entrance still keeps the serial number “CA-195”. Mr. Cheang Kuok Heng visited the site in 2013. He said that at that time, there should be an entrance temporarily closed by a 1.2-meter-wide and 1.2-meter-long concrete slab in the center of the ground inside the pillbox, which may be related to shooting or tunnels.

路環 · 炮台山 Coloane - Morro de Artilharia Hill

- 碉堡設在山頂標高柱附近，約坐西北向東南，平面呈矩形，約為 3 米寬、3 米長，整個藏於地下，只有前部露出地面約高 70 公分，整體以鋼筋混凝土建造。前部凸出為八角形，其上部有圓形頂蓋。內部可分為兩個空間，八角形平面的部分地面較高，並有樓梯分隔，該處頂部水平 360 度方向開有共 8 個機槍射擊口，內側仍留有原本可上下推拉開合的鐵製掩護板，均鏽蝕嚴重。其結構與大潭山（一）相似。
- The pillbox locates near the elevation column on the top of the hill. It locates at the northwest and faces the

southeast, with a rectangular plane, about 3 meters wide and 3 meters long. The whole pillbox is hidden underground, only the front part is exposed to the ground with about 70 cm high, and the whole structure is built with reinforced concrete. Its structure is similar to Taipa Grande Hill (Part 1). The front protrudes in an octagonal shape with a rounded top cover on the top. The interior part can be divided into two spaces. Part of the octagonal plane is higher on the ground and separated by stairs. There are a total of 8 machine gun firing ports on the top of the 360-degree horizontal direction. The shielding plates are all severely rusted.

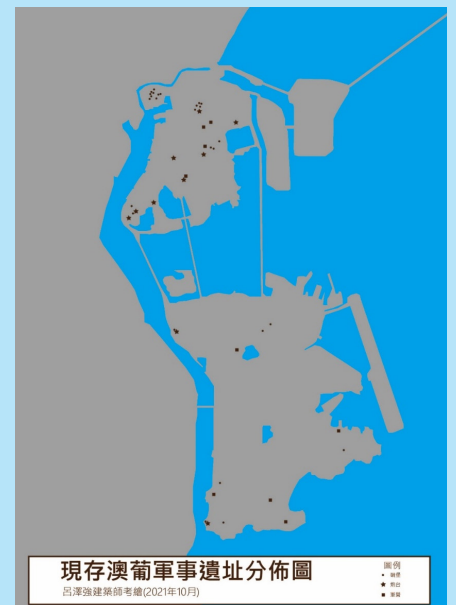
路環 · 九澳山 Coloane - Monte de Ká-Hó Hill

- 碉堡位於山頂瞭望塔（俗稱高塔）附近，坐西向東，平面呈矩形，約 3 米寬、3 米長，整個藏於地下，只有前部露出地面約高 70 公分，整體以鋼筋混凝土建造。前部凸出為八角形，其上部有圓形頂蓋。內部可分為兩個空間，八角形平面的部分地面較高，並有樓梯分隔，該處頂部水平 360 度方向開有共 8 個機槍射擊口，仍留有幾塊鐵製機槍射擊口掩護板，均鏽蝕嚴重並散落在地上，碉堡外仍有戰壕遺蹟。2020 年 12 月有關部門開闢登山道路後，碉堡四周草叢被清除，碉堡完全外露，八角形的部分亦因使用施工機械而遭破損，部分混凝土結構破裂並散落在地上。
- The pillbox locates near the Ká-Hó Village Watch Tower (Observation Post CO-184) on the top of the hilltop observation tower (commonly known as the high tower). It locates at the west and faces to the east, with a rectangular plane. It's about 3 meters wide and 3 meters long. The whole pillbox is hidden underground, only the front is exposed to the ground in about 70 cm high. The pillbox is constructed with reinforced concrete. The front protrudes in an octagonal shape with a rounded top cover on the top. The interior can be divided into two spaces. The part of the octagonal plane is higher on the ground and separated by stairs. There are a total of 8 machine gun firing ports on the top of the 360-degree horizontal direction, and there are still several iron machine gun firing port shields. They are severely rusted and scattered on the ground, and there are still remnants of trenches outside the pillbox. In December 2020, after the relevant departments constructed a mountaineering road, the grass around the pillbox was removed, and the pillbox was completely exposed. The octagonal part was also damaged due to the use of construction machinery, and some of the concrete structures were cracked and scattered on the ground.

以上碉堡的坐向及機槍射擊口朝向（即防禦方向），大部分是指向內港及橫琴十字門水道，結合其他位於青洲山、望廈山、東望洋山上的碉堡坐向，20 世紀建造的碉堡群在澳門半島、氹仔和路環組成一個向東南西北四周的防禦系統。

它們與當時已有的炮台和軍營都是在 1975 年 12 月 31 日葡軍撤走之前的軍事防禦據點。

The sitting direction of most above-mentioned pillboxes and the direction of the machine gun firing port (that is, the defensive direction), point to the Inner Harbour and Hengqin Shizimen Canal. Combined with the sitting direction of other pillboxes located in the Ilha Verde Hill, the Mong-Há Hill, and the Guia Hill, the group of pillboxes built in the twentieth century form a defensive system around the Macau Peninsula, Taipa and Coloane. Together with the fort and barracks that existed at the time, they were all military defense strongholds before the withdrawal of the Portuguese army on 31 December 1975.



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